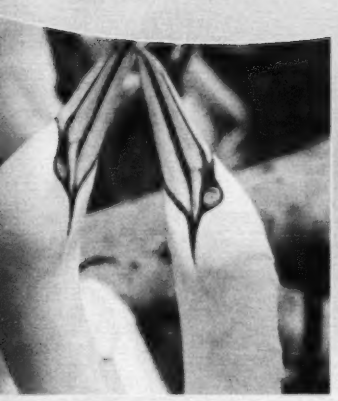
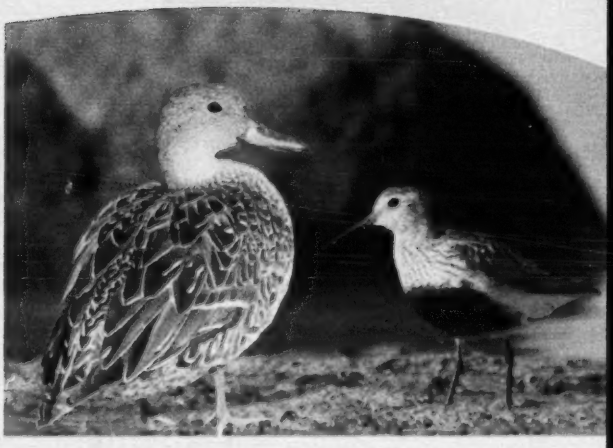
Environment Canada Environnement Canada

Bird Conservation Strategy for Bird Conservation Region 3 in Newfoundland and Labrador: Arctic Plains and Mountains

October 2013





Canada

Cat. No.: CW66-320/4-2012E-PDF
ISBN: 978-1-100-99602-8

Aussi disponible en français

Preface

Environment Canada (EC) led the development of all-bird conservation strategies in each of Canada's Bird Conservation Regions (BCRs) by drafting new strategies and integrating new and existing strategies into an all-bird framework. These integrated all-bird conservation strategies will serve as a basis for implementing bird conservation across Canada, and will also guide Canadian support for conservation work in other countries important to Canada's migrant birds. Input to the strategies from EC's conservation partners is as essential as their collaboration in implementing their recommendations.

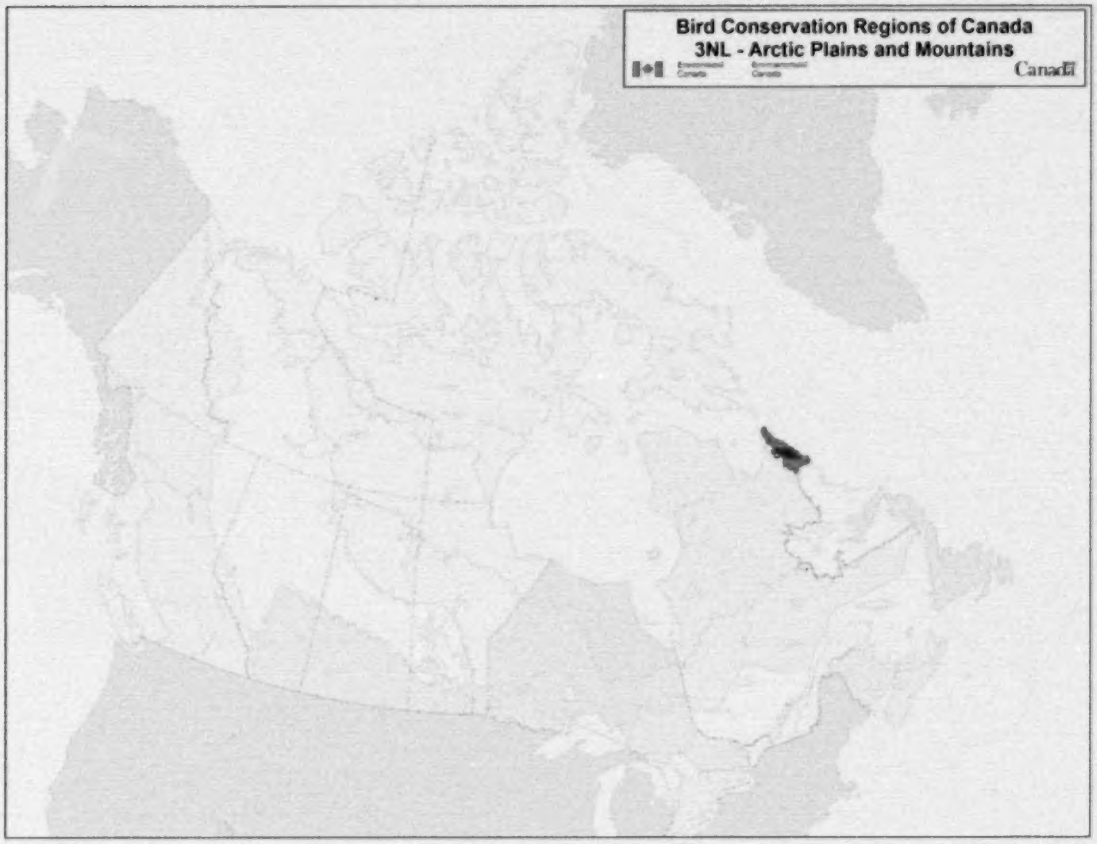
Environment Canada has developed national standards for strategies to ensure consistency of approach across BCRs. Bird Conservation Strategies will provide the context from which specific implementation plans can be developed for each BCR, building on the programs currently in place through Joint Ventures or other partnerships. Landowners including Aboriginal peoples will be consulted prior to implementation.

Conservation objectives and recommended actions from the conservation strategies will be used as the biological basis to develop guidelines and beneficial management practices that support compliance with regulations under the *Migratory Birds Convention Act, 1994*.

Acknowledgements

This document follows templates developed by Alaine Camfield, Judith Kennedy and Elsie Krebs with the help of the BCR planners in each of the Canadian Wildlife Service regions throughout Canada. However, work of this scope cannot be accomplished without the contribution of other colleagues who provided or validated technical information, commented on earlier draft versions of the strategy, and supported the planning process. We would like to extend a sincere thanks to the following people: Karyne Bellehumeur, Doug Bliss, Andrew Boyne, Paul Chamberland, Kevin Davidson, Michael Elliott, Carina Gjerdrum, Alan Hanson, Christie MacDonald, Paul MacDonald, Bryan Martin, Bruce Pollard, Martin Raillard, Isabelle Robichaud, Dane Stuckel, Peter Thomas, Kyle Wellband, Becky Whittam, and other reviewers.

Bird Conservation Strategy for Bird Conservation Region 3 in Newfoundland and Labrador: Arctic Plains and Mountains



Recommended citation:

Environment Canada. 2013. *Bird Conservation Strategy for Bird Conservation Region 3 in Newfoundland and Labrador: Arctic Plains and Mountains.* Canadian Wildlife Service, Environment Canada. Sackville, New Brunswick. iv + 64 pp. + 3 appendices.

Table of Contents

Executive Summary

This strategy pulls together the best available information from the literature on bird conservation in Newfoundland and Labrador. It identifies priority species for conservation, the key threats affecting them and the major conservation actions required to protect them. Its goal is to become a tool for future conservation planning, a one-stop shop where important information on bird conservation is conveniently pulled together and displayed. It builds on existing bird conservation strategies and complements those created for the other Bird Conservation Regions (BCR) across Canada using the best available information extracted from a national database. Collectively, the strategies will serve as a framework for implementing bird conservation nationally, and also identify international conservation issues for Canada's priority birds. Strategies are not highly prescriptive, but rather are intended to guide future implementation efforts undertaken by various partners and stakeholders. Below is an outline of the priority species groups and the main threats and conservation actions identified.

Bird Conservation Region 3 (BCR 3: Arctic Plains and Mountains) in the province of Newfoundland and Labrador extends into the Torngat Mountains region of northern Labrador and covers an area of approximately 18 500 km^2 or 7% of the province. This region contains both tundra and alpine landscapes found within arctic plains and mountains, which are characterized by bare soil, rocky outcrops, lichens, as well as limited vegetation such as mosses, sedges and woody shrubs.

In BCR 3 NL, there are 17 priority bird species. The habitats used by the greatest number of priority bird species are shrubs and early successional habitat (65%), coastal (above high tide; 59%), riparian (41%) and wetlands (41%). As this region is mostly contained within the Torngat Mountains National Park Reserve, few localized threats are anticipated. The major threat to priority bird species in BCR 3 NL is climate change, but there are also large gaps in our knowledge of species distribution, abundance and population trends in this northern and isolated region. Less severe threats to priority bird species in this area include hunting, disturbance from human recreation, competition with similar species for resources, and, to a lesser extent, heavy metal contamination.

The most frequently identified conservation objective in BCR 3 NL is to manage climate change, followed by improving our understanding of priority bird species. Recommended actions to address climate change are to support efforts in order to reduce greenhouse gas emissions; manage for habitat resilience to allow ecosystems to adapt despite disturbances and changing conditions; minimize anthropogenic stressors (such as development or pollution) to help maintain resilience; manage buffer areas and the habitat between protected areas to enhance movement of species across the landscape; manage ecosystems to maximize carbon storage and sequestration while simultaneously enhancing bird habitat; and incorporate predicted shifts in habitat into landscape-level plans. Many of these actions would need to be implemented at scales greater than the BCR. The development and implementation of monitoring programs is recommended to address knowledge gaps regarding the distribution, abundance and population trends of priority bird species.

We hope that the information in this strategy will become a useful tool for future conservation planning, especially in terms of habitat conservation, as it presents relevant information on priority species, threats and conservation actions in a convenient summary format.

Introduction: Bird Conservation Strategies

Context

This document is one of a suite of Bird Conservation Region Strategies (BCR strategies) that have been drafted by Environment Canada for all regions of Canada. These strategies respond to Environment Canada's need for integrated and clearly articulated bird conservation priorities to support the implementation of Canada's migratory birds program, both domestically and internationally. This suite of strategies builds on existing conservation plans for the four "bird groups" (waterfowl[1], waterbirds[2], shorebirds[3], and landbirds[4]) in most regions of Canada, as well as on national and continental plans, and includes birds under provincial/territorial jurisdiction. These new strategies also establish standard conservation planning methods across Canada and fill gaps, as previous regional plans do not cover all areas of Canada or all bird groups.

These strategies present a compendium of required actions based on the general philosophy of achieving scientifically based desired population levels as promoted by the four pillar initiatives of bird conservation. Desired population levels are not necessarily the same as minimum viable or sustainable populations, but represent the state of the habitat/landscape at a time prior to recent dramatic population declines in many species from threats known and unknown. The threats identified in these strategies were compiled using currently available scientific information and expert opinion. The corresponding conservation objectives and actions will contribute to stabilizing populations at desired levels.

The BCR strategies are not highly prescriptive. In most cases, practitioners will need to consult additional information sources at local scales to provide sufficient detail to implement the recommendations of the strategies. Tools such as beneficial management practices will also be helpful in guiding implementation. Partners interested in participating in the implementation of these strategies, such as those involved in the habitat Joint Ventures established under the North American Waterfowl Management Plan (NAWMP), are familiar with the type of detailed implementation planning required to coordinate and undertake on-the-ground activities.

---

[1] NAWMP Committee 2004.
[2] Milko et al. 2003.
[3] Donaldson et al. 2000.
[4] Rich et al. 2004.

Strategy Structure

This strategy includes one planning unit: Bird Conservation Region 3 in Newfoundland and Labrador (BCR 3 NL). The geographic boundaries of this unit include the terrestrial portion of northern Labrador and extend to the high-tide line. The Bird Conservation Strategy for Bird Conservation Region 7 and Marine Biogeographic Unit 10 in Newfoundland and Labrador (Taiga Shield and Hudson Plains, and Newfoundland-Labrador Shelves; Environment Canada 2013) provides bird conservation priorities in the marine waters and intertidal coast of the Newfoundland and Labrador Shelves (MBU 10 NL).

Section 1 of this strategy presents general information about the BCR and the subregion, with an overview of the six elements[5] that provide a summary of the state of bird conservation at the subregional level. Section 2 provides more detail on the threats, objectives and actions for priority species grouped by each of the broad habitat types in the subregion. Section 3 presents additional widespread conservation issues that are not specific to a particular habitat or were not captured by the threat assessment for individual species, as well as research and monitoring needs, and threats to migratory birds while they are outside of Canada. The approach and methodology are summarized in the appendices, but details are available in a separate document (Kennedy et al. 2012). A national database houses all the underlying information summarized in this strategy and is available from Environment Canada.

[5] The six elements are: Element 1- Priority Species Assessment; Element 2 – Habitats Important to Priority Species; Element 3 – Population Objectives; Element 4 – Threat Assessment for Priority Species; Element 5 –Conservation Objectives; Element 6 – Recommended Actions.

Characteristics of Bird Conservation Region 3: Arctic Plains and Mountains in Newfoundland and Labrador

BCR 3 (Arctic Plains and Mountains) is an extensive region that covers almost 308 000 km^2 across the Canadian Arctic and northern Alaska, which encompasses northern Yukon, Northwest Territories, Quebec, Labrador and most of Nunavut (Environment Canada 2011). The region is characterized by low-lying, coastal tundra and drier uplands of the rocky Arctic mountains. The freezing and thawing of the thick and continuous permafrost form a patterned mosaic of polygonal ridges and ponds. Many rivers bisect the plains and flow into the Arctic Ocean. The ocean surface is generally frozen 9 to 10 months of the year, and the ice pack is never far from shore (North American Bird Conservation Initiative 2013).

The portion of BCR 3 in the province of Newfoundland and Labrador extends into the Torngat Mountains region of northern Labrador and covers an area of approximately 18 500 km^2 or 7% of the province. This area contains tundra and alpine landscapes found within the Arctic plains and mountains (Fig. 1). The region is characterized by bare soil, rocky outcrops and lichens. Vegetation is sparse and limited to mosses, sedges and woody shrubs.

The population of Newfoundland and Labrador is an estimated 512 659 people; however only 6% (30 760) reside in Labrador (Newfoundland and Labrador Statistics Agency 2013). The north coast is the most isolated region in the province, where snowmobiles, boats, and planes are the only current modes of transportation. In addition, there are no longer any communities or permanent human residents in this area (Encyclopedia Britannica Online 2013).

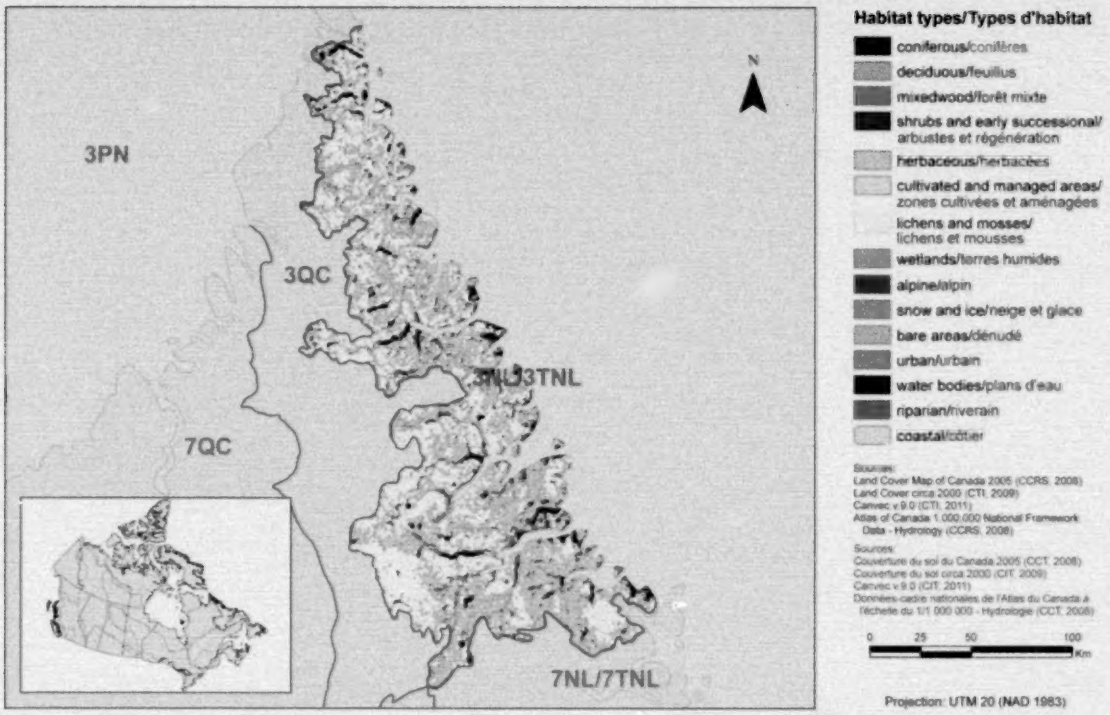


Figure 1. Land cover in BCR 3 NL.
The red line delineates the geographic boundaries established by the North American Bird Conservation Initiative for the BCRs. The boundaries of BCR 3 NL extend to the high-tide line.

Northern Labrador has a polar tundra climate. The region is dry and cold, with short summers (mean temperature of 4°C) and long winters (mean temperature of -16.5°C). Precipitation is lower than elsewhere in the province and mostly falls as snow over the higher peaks of the central region (Encyclopedia Britannica Online 2013).

There are few current and potential threats to the region's avifauna. As this portion of BCR 3 is mostly contained within the Torngat Mountains National Park Reserve, few localized threats are anticipated. The major threat in this region is climate change, but there are also large gaps in our knowledge of species' distribution, abundance and population trends in this northern and isolated region. Less severe threats to priority bird species in this area include hunting, disturbance from human recreation, competition with similar species for resources, and, to a lesser extent, lethal or sublethal toxic effects due to heavy metal contamination.

The Labrador portion of the province of Newfoundland and Labrador has nearly 3.5% of its surface area (terrestrial: 9 893 km^2; marine: 83 km^2) protected either as provincially or federally administered areas (Canadian Council on Ecological Areas 2011; Fig. 2). There are no National Wildlife Areas or Migratory Bird Sanctuaries in Labrador. The largest protected area is the Torngat Mountains National Park, which covers more than half of the BCR 3 region in Labrador

(9 700 km^2) and is managed by the Parks Canada Agency. In addition, some areas have designations that recognize ecological uniqueness (but do not formally protect habitat), elevate public awareness and promote the conservation of ecologically significant habitats. In this region, these include two Important Bird Areas (IBA) at Seven Islands Bay (787 km^2) and on Galvano Island[6] (45 km^2).

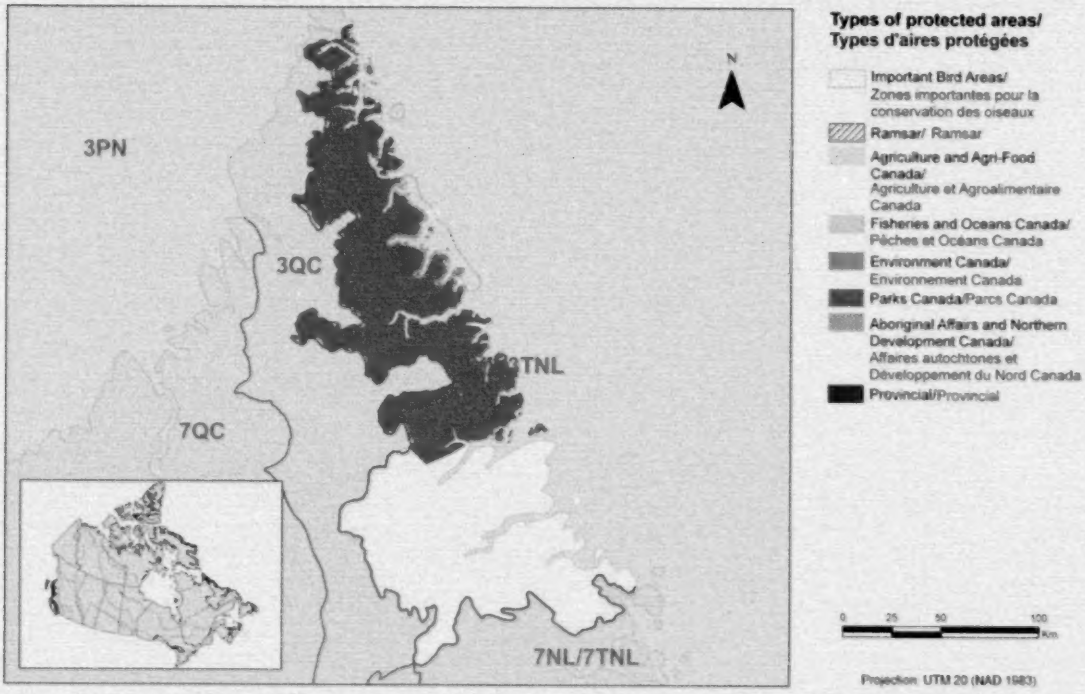


Figure 2. Map of protected and designated areas in BCR 3 NL.

[6] The IBA is located in Marine Biogeographic Unit 10 NL; please see Environment Canada 2013 for additional information.

Section 1: Summary of Results – All Birds, All Habitats

Element 1: Priority Species Assessment

These Bird Conservation Strategies identify "priority species" from all regularly occurring bird species in each BCR subregion (see Appendix 1). Species that are vulnerable due to population size, distribution, population trend, abundance and threats are included because of their "conservation concern". Some widely distributed and abundant "stewardship" species are also included. Stewardship species are included because they typify the national or regional avifauna and/or because they have a large proportion of their range and/or continental population in the subregion; many of these species have some conservation concern, while others may not require specific conservation effort at this time. Species of management concern are also included as priority species when they are at (or above) their desired population objectives but require ongoing management because of their socio-economic importance as game species or because of their impacts on other species or habitats (see Appendix 2).

The purpose of the prioritization exercise is to focus implementation efforts on the issues of greatest significance for Canadian avifauna. Table 1 provides a full list of all priority species and their reason for inclusion in BCR 3 NL. Tables 2 and 3 summarize the number of priority species in BCR 3 NL by bird group and by the reason for priority status.

In BCR 3 NL, there are 17 priority species (Table 1), about half of which are landbirds (9 species). The priority species list also includes 3 shorebirds, 2 waterbirds and 3 waterfowl species. Overall, 38% of waterfowl are priority species, compared to 32% of landbirds, 30% of shorebirds and 20% of waterbirds (Table 2). Three of the priority species are formally protected under the Government of Canada's *Species at Risk Act* (SARA; Species at Risk Public Registry 2012): Harlequin Duck (Eastern), Peregrine Falcon (*anatum/tundrius*), and Short-eared Owl (Table 3).

The most frequent reasons that the inclusion of landbirds on the priority species list for BCR 3 and MBU 10 NL are related to regional concerns or stewardship whereas the reasons for considering shorebirds or waterbirds as priority species are typically related to national or continental concerns (Table 3). The main explanation for this difference is due to a lack of information at the regional level for many of the shorebird and waterbird species. As for waterfowl, the main reason for their inclusion as priority species is due either to their inclusion as a "key species" in the Eastern Habitat Joint Venture (EHJV) Implementation Plan (EHJV 2010) or their status rank of moderate-high, high or higher under the North American Waterfowl Management Plan (NAWMP Committee 2004; Table 3).

Table 2. Summary of priority species by bird group in BCR 3 NL.

Bird Group	Total Species (% of avifauna)	Total Priority Species	Percent Listed as Priority	Percent of Priority List
Landbirds	28 (50%)	9	32%	53%
Shorebirds	10 (18%)	3	30%	17.5%
Waterbirds	10 (18%)	2	20%	12%
Waterfowl	8 (14%)	3	37%	17.5%
Total	**56**	**17**	**30%**	**100%**

Table 3. Number of priority species in BCR 3 NL by reason for priority status.

Reasons for Priority Listing[1]	Landbirds	Shorebirds	Waterbirds	Waterfowl
Total	**9**	**3**	**2**	**3**
COSEWIC[2]	2	0	0	1
Federal SARA listed[3]	2	0	0	1
Provincial listed[4]	3	0	0	1
NAWMP[5]	-	-	-	3
National/Continental Concern	0	3	1	-
National/Continental Stewardship	4	-	-	-
Regional/Subregional Concern	0	-	-	-
Regional/Subregional Stewardship	6	0	1	-
Added during expert reviews[6]	0	0	0	0

[1] A single species can be on the priority list for more than one reason. Note that not all reasons for inclusion apply to every bird group (indicated by "-").

[2] COSEWIC indicates species assessed by the Committee on the Status of Endangered Wildlife in Canada as Endangered, Threatened or Special Concern (COSEWIC 2012).

[3] Species listed on Schedule 1 of the *Species at Risk Act* as Endangered, Threatened or Special Concern (Species at Risk Public Registry 2012).

[4] Species listed under Newfoundland and Labrador's *Endangered Species Act* as Endangered, Threatened or Vulnerable (Newfoundland and Labrador Department of Environment and Conservation 2013).

[5] Waterfowl identified as "key species" for Newfoundland and Labrador in the EHJV Implementation Plan (2007-2012), or scored as "Moderately-High", "High" or "Highest" in either the breeding or non-breeding conservation and/or monitoring needs for waterfowl conservation region 3 (analogous to BCR 3) of the NAWMP (NAWMP Committee 2004).

[6] Species added by the Newfoundland and Labrador Technical Working Group.

Element 2: Habitats Important to Priority Species

Identifying the broad habitat requirements for each priority species within the BCR and the MBU allowed species to be grouped by shared habitat-based conservation issues and actions (see Appendix 2 for details on how species were assigned to standard habitat categories). If many priority species associated with the same habitat face similar conservation issues, then conservation action in that habitat may support populations of several priority species. BCR strategies use a modified version of the standard land cover classes developed by the United Nations (Food and Agriculture Organization 2000) to categorize habitats, and species were often assigned to more than one habitat class.

The assignment of habitat associations for priority bird species was done through literature review and expert consultation. For each priority bird species in BCR 3 NL, all of its known habitat associations were considered, not just the primary habitat associations (see Table A-2 for a complete list of those habitat associations). Because of variability in the quality and availability of information related to species-habitat associations, quantifying the relative importance of any given habitat was not possible. In this document, statements regarding the importance of habitat types for priority bird species are related to the number of priority bird species associated with each habitat and may not reflect the overall importance of a given habitat to all bird species in the planning unit. For instance, while herbaceous habitats cover a large portion of the BCR 3 NL (Fig. 1), no priority bird species were associated with this habitat.

In BCR 3 NL, shrub/early successional habitats are used by the greatest number of priority bird species (11 species; Fig. 3). Coastal (above high tide) habitats are also important as they are used by 10 species, while both the riparian and wetland habitats are used by 7 species. Bare areas and lichens/mosses habitats are used by the fewest priority bird species (4 species; Fig. 3).

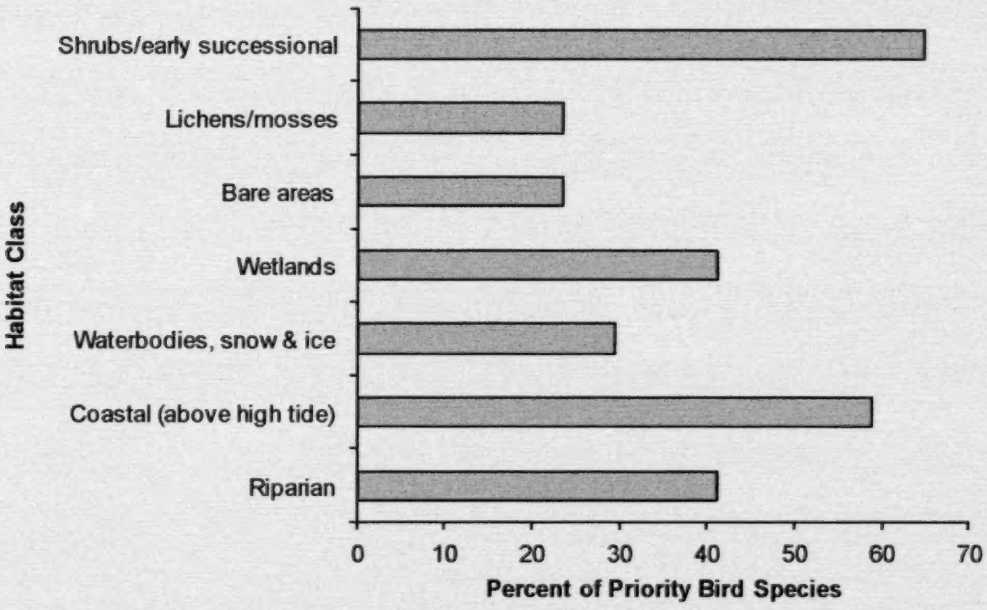


Figure 3. Percent of priority species that are associated with each habitat class in BCR 3 NL.
Note: The total exceeds 100% because each species may be assigned to more than one habitat.

Element 3: Population Objectives

Population objectives allow us to measure and evaluate conservation success. The objectives in this strategy are assigned to categories and are based on a quantitative or qualitative assessment of species' population trends. If the population trend of a species is unknown, the objective is set as "assess and maintain", and a monitoring objective is given (see Appendix 2). For any species listed under the *Species at Risk Act* (SARA) or under provincial/territorial endangered species legislation, Bird Conservation Strategies defer to population objectives in available Recovery Strategies and Management Plans. The ultimate measure of conservation success will be the extent to which population objectives have been reached over the next 40 years. Population objectives do not currently factor in feasibility of achievement, but are held as a standard against which to measure progress.

In BCR 3 NL, the population objective for six priority bird species is to maintain current levels, an indication that population trends for these species are stable (Fig. 4). These species are, however, still considered priorities due to other factors such as national/continental and regional/subregional concern or stewardship status (Table 1). Ten priority bird species have a population objective of "assess/maintain", indicating that there are insufficient data to reliably assess a trend, therefore additional monitoring is required for these species (Fig. 4). There is only one priority bird species with identified population declines: the Canada Goose (North Atlantic), which has a population objective of increase by 50% (Table 1; Fig. 4).

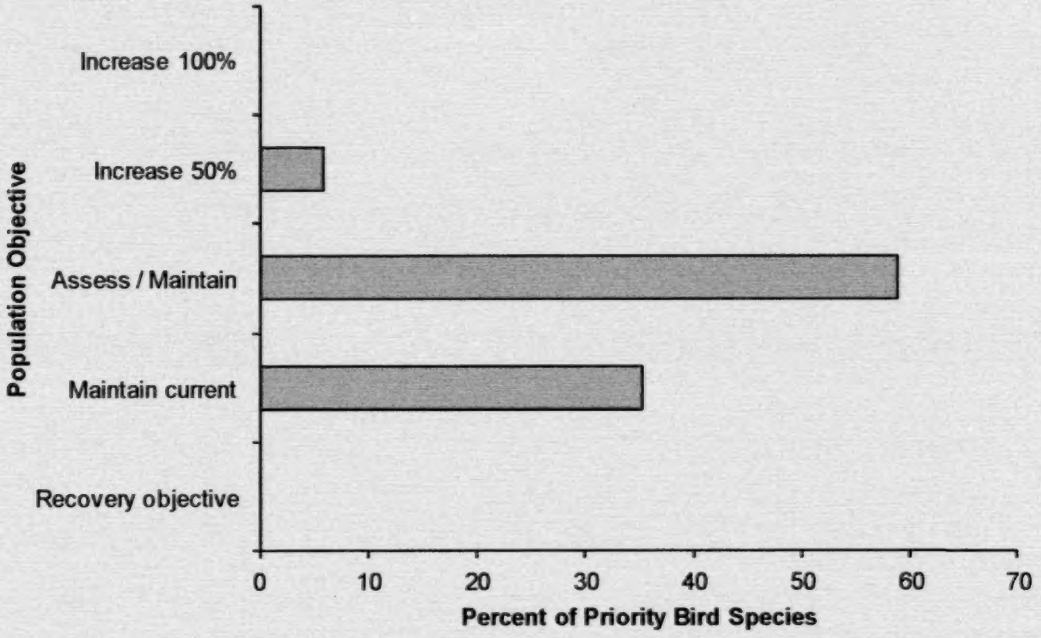


Figure 4. Percent of priority species that are associated with each population objective category in BCR 3 NL.

Element 4: Threat Assessment for Priority Species

The threat assessment process (see Appendix 2) identifies threats believed to have a population-level effect on individual priority species. These threats are assigned a relative magnitude (Low, Medium, High, Very High), based on their scope (the proportion of the species' range within the subregion that is impacted) and severity (the relative impact on the priority species' population). This allows us to target conservation actions towards threats with the greatest effects on suites of species or in broad habitat classes. Some well-known conservation issues (such as predation by domestic cats or climate change) may not be identified in the literature as significant threats to populations of an individual priority species and therefore may not be captured in the threat assessment. However, they merit attention in conservation strategies because of the large numbers of individual birds affected in many regions of Canada. We have incorporated them in a separate section on Widespread Issues, but, unlike other threats, they are not ranked. In BCR 3 NL, a category was added to the threats classification scheme to allow for the inclusion of inadequate monitoring or research information (category 12 "Other direct threats" and sub-category 12.1 "Information lacking"). The following discussion focuses mainly on the highest-ranked threats and notes a few medium and low-ranked threats where appropriate.

A complete list of threats for all priority bird species in BCR 3 NL is included in Appendix 1 (see Table A-3). Some of the threats identified are not unique to a particular habitat (for example, legal hunting and incidental take by poachers/trappers) while others are specific (for example, habitat degradation due to sea-level rise and increasing severity or frequency of storms in coastal habitats). These threats are categorized as per Salafsky et al. 2008 (see Table A-4 in Appendix 3 for a complete list of threat categories).

Once individually ranked threats are rolled up for each habitat class in BCR 3 NL, the overall threat magnitude is high in the shrub/early successional, wetland, coastal (above high tide) and riparian habitats. The remaining habitat classes have an overall threat magnitude of medium (Table 4).

In BCR 3 NL, the highest-ranked and most frequently identified threats were gaps in knowledge of priority bird species' distribution, abundance and population trends (12.1 Information lacking; ranked very high); as well as habitat loss or degradation from changes in habitat structure (e.g., drying, thawing of tundra), species' ranges, changes to food webs and altered timing of seasonal cues (e.g., egg laying, migration) due to climate change (11.1 Habitat shifting and alteration; ranked high; Fig. 5). Hunting, poaching and incidental take was also a frequently identified threat (5.1 Hunting and collecting of terrestrial animals; ranked low; Fig. 5).

Threats to priority species while they are outside Canada during the non-breeding season were also assessed and are presented in the Threats Outside Canada section.

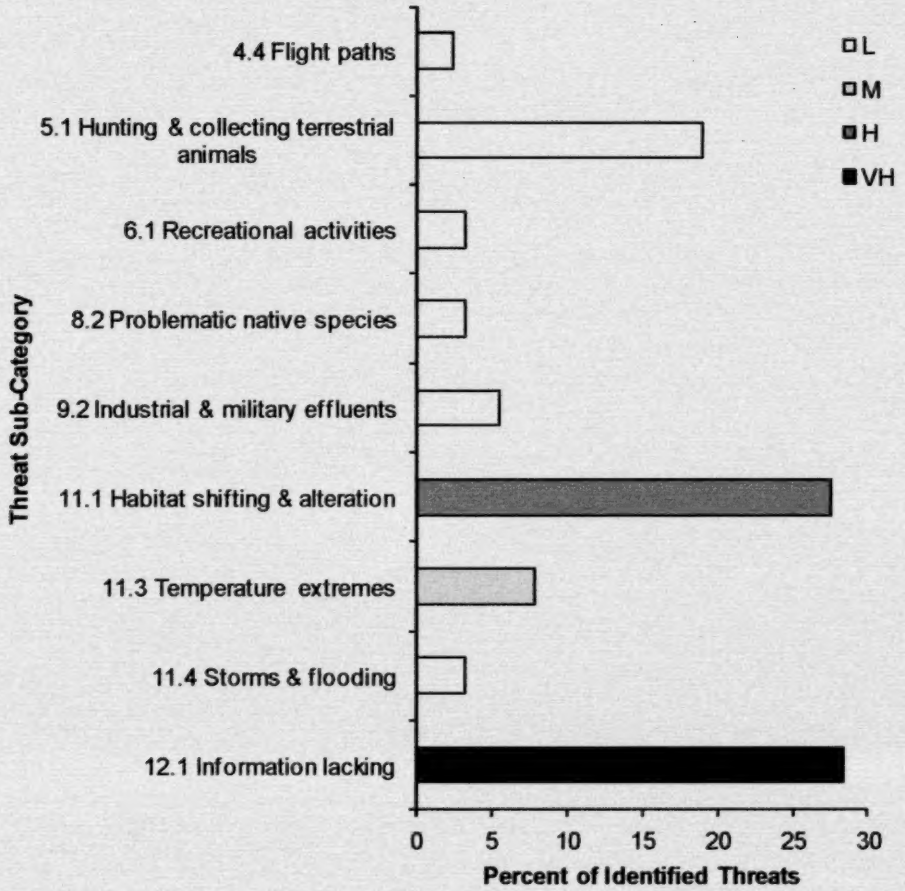


Figure 5. Percent of identified threats to priority species within BCR 3 NL by threat sub-category. Each bar represents the percent of the total number of threats identified in each sub-category of BCR 3 NL (for example, if 100 threats were identified in total for all priority species in BCR 3 NL, and 10 of those threats were in the sub-category 1.1 Housing and urban areas, the bar on the graph would represent this as 10%). Shading in the bars (VH = very high, H = high, M = medium and L = low) represents the rolled up magnitude of all threats in each threat sub-category in the BCR. (See Appendix 2 for details on the assessment of magnitude).

Element 5: Conservation Objectives

Conservation objectives were designed to address threats and information gaps that were identified for priority species. They describe the environmental conditions and research and monitoring that are thought to be necessary for progress towards population objectives and to understand underlying conservation issues for priority bird species. As conservation objectives are reached, they will collectively contribute to achieving population objectives. Whenever possible, conservation objectives were developed to benefit multiple species, and/or respond to more than one threat (see Appendix 2).

In BCR 3 NL, aside from managing climate change, which is discussed in Section 3: Additional Issues, there were only three categories of conservation objectives identified for priority bird species. The most common conservation objective was improving our understanding of priority bird species, followed by reducing mortality or increasing productivity. There were also a few conservation objectives related to reducing disturbance in sensitive areas (Fig. 6).

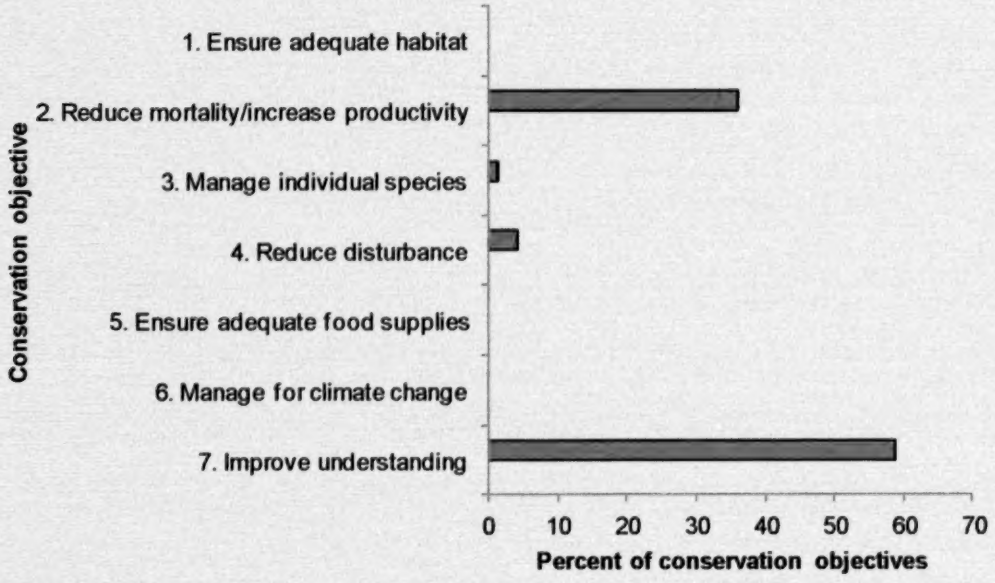


Figure 6. Percent of all conservation objectives assigned to each conservation objective category in BCR 3 NL.

Note: Widespread issues (including climate change) were excluded from this calculation as these are detailed in Section 3: Additional Issues.

Element 6: Recommended Actions

Recommended actions indicate on-the-ground activities that will help to achieve the conservation objectives (Fig. 7). Actions are strategic rather than highly detailed and prescriptive (see Appendix 2). Whenever possible, recommended actions benefit multiple species, and/or respond to more than one threat. Recommended actions defer to or support those provided in recovery documents for species at risk at the federal, provincial or territorial level, but will usually be more general than those developed for individual species.

The recommended conservation actions are classified following the categories developed by the International Union for Conservation of Nature – Conservation Measures Partnership (IUCN-CMP) with the addition of categories for research and monitoring (see Table A-5 in Appendix 3 for a complete list of conservation actions categories). In BCR 3 NL, aside from the conservation actions addressing threats related to climate change (which outnumbered those associated with any other threat and are discussed in Section 3: Additional Issues), the most frequently identified recommended conservation actions fell under the sub-category 4.3 Awareness and communications (Fig. 7). Examples of these actions include raising general public awareness through education programs on issues such as hunting and/or the vulnerability of species to human disturbance at breeding, foraging, moulting and/or staging sites (see Section 2 for more examples).

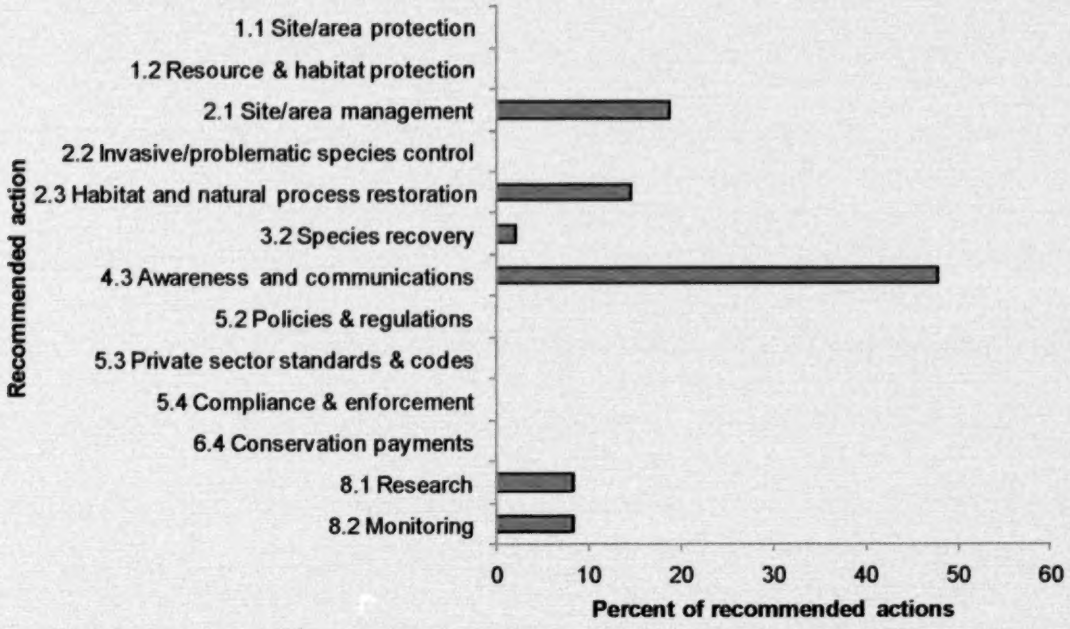


Figure 7. Percent of recommended conservation actions assigned to each sub-category in BCR 3 NL.
Note: 8.1 Research and 8.2 Monitoring sub-categories refer to specific species where additional information is required. For a discussion of broad-scale research and monitoring requirements, see Research and Population Monitoring Needs in Section 3.

Section 2: Conservation Needs by Habitat

The following sections provide more detailed information on priority species, their threats and objectives within each of the broad habitat classes that occur in BCR 3 NL. Where appropriate, habitat information is provided at a finer scale than the broad habitat categories in order to coincide with other land management exercises in the region. Some species do not appear in the threats table because their low-level threats have not been assigned objectives or actions and/or identified threats are addressed in the Widespread Issues section of the strategy.

Shrub/Early Successional

The habitat classification scheme is based on standard land cover classes developed by the United Nations (Food and Agriculture Organization 2000); however, it is important to note that there are no early successional habitats in BCR 3 NL, therefore this section considers only shrubs. These shrub habitats in BCR 3 NL are characterized by dry ridges, rocky areas, grassy hummocks and peat bogs (Fig. 8). Vegetation in these areas includes shrubs (e.g., arctic dwarf willow or birch), sedges, graminoids and berry-bearing plants (e.g., blueberry).

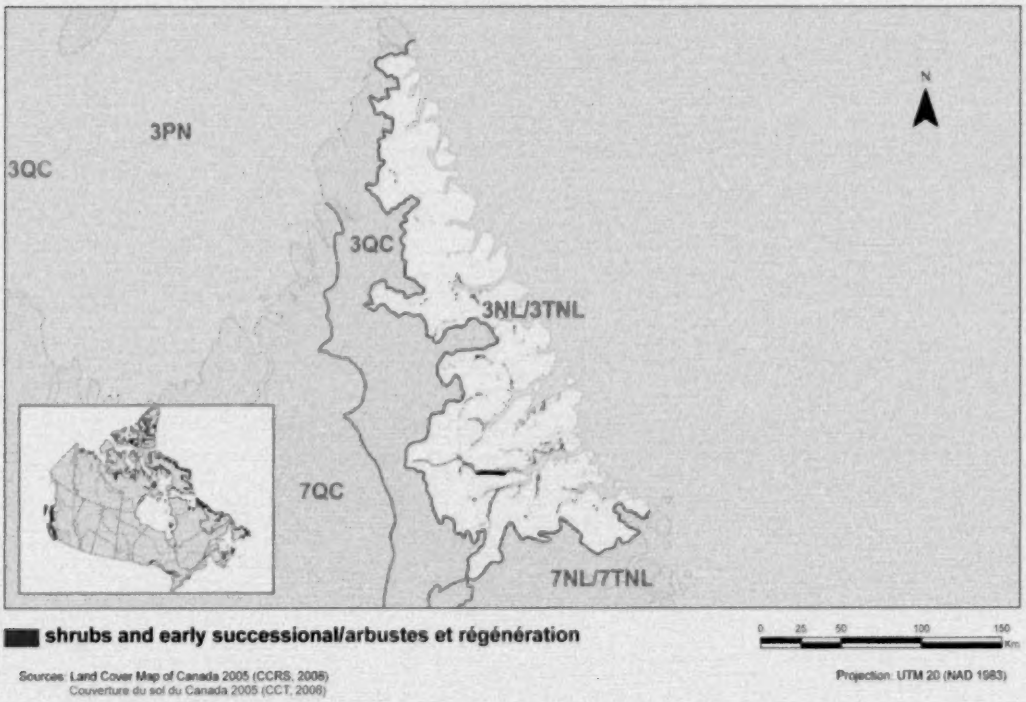


Figure 8. Map of shrubs and early successional habitats in BCR 3 NL.

There are 11 priority bird species found in shrub/early successional habitats of BCR 3 NL (Table 5); eight landbirds, two shorebirds and one waterfowl species. Of these, three are species at risk. All of the priority bird species are found in inland barrens and/or non-specific tundra habitat sub-classes (Table 5).

The highest-ranked threat to priority bird species identified in the shrub/early successional habitats of BCR 3 NL was the gap in knowledge of species' distribution, abundance and population trends (12.1 Information lacking; ranked very high; Fig. 9). The second-highest ranked threat was habitat loss or degradation from changes in habitat structure (e.g., drying, thawing of tundra), shifts in species' ranges, changes to food webs and altered timing of seasonal cues (e.g., egg laying, migration) due to climate change (11.1 Habitat shifting and alteration; ranked high; Fig. 9). Another important threat was habitat degradation or reductions in survival due to thermal stress as a result of climate change (11.3 Temperature extremes; ranked medium; Fig. 9). Also, reductions in survival due to hunting, poaching and incidental (such as trapping, falconry, or the collection of nestlings and eggs) was a frequently identified threat to priority bird species in this habitat, although it was ranked as low (5.1 Hunting and collecting of terrestrial animals; Fig. 9).

The development and implementation of monitoring programs is recommended to address knowledge gaps regarding the distribution, abundance and population trends of priority bird species (see "Research and Population Monitoring Needs"). Recommended conservation actions to address climate change are presented in the "Widespread Issues" section of this document (see "Climate Change"). Conservation actions for low-ranked threats to priority bird species in shrub/early successional habitats are available in the database but are not presented in this document.

Table 1. Priority bird species in BCR 3 NL, population objective, and the reason for priority status.

Priority Species	Bird Group	Population Objective	SARA[1]	COSEWIC[2]	Provincial Listing[3]	National/Continental Concern	National/Continental Stewardship	Regional/Subregional Concern	Regional/Subregional Stewardship	Waterfowl[4]	Expert Review[5]
Golden Eagle	Landbirds	Maintain current							Y		
Gray-cheeked Thrush	Landbirds	Assess/Maintain			VU						
Gyrfalcon	Landbirds	Maintain current					Y		Y		
Northern Wheatear	Landbirds	Maintain current					Y		Y		
Peregrine Falcon (*anatum/tundrius*)	Landbirds	Assess/Maintain[6]	SC	SC	VU				Y		
Rough-legged Hawk	Landbirds	Maintain current					Y		Y		
Short-eared Owl	Landbirds	Assess/Maintain[6]	SC	SC	VU						
Snow Bunting	Landbirds	Maintain current					Y				
Snowy Owl	Landbirds	Maintain current							Y		
American Golden-Plover	Shorebirds	Assess/Maintain				Y					

[1] Species listed on Schedule 1 under the *Species at Risk Act* as Endangered (EN), Threatened (TH) or Special Concern (SC) (Species at Risk Public Registry 2012).
[2] Species assessed by the Committee on the Status of Endangered Wildlife in Canada as Endangered (EN), Threatened (TH), or Special Concern (SC) (COSEWIC 2012).
[3] Species listed under Newfoundland and Labrador's *Endangered Species Act* as Endangered (EN), Threatened (TH), or Vulnerable (VU) (Newfoundland and Labrador Department of Environment and Conservation 2013).
[4] Waterfowl identified as "key species" for Newfoundland and Labrador in the Eastern Habitat Joint Venture Implementation Plan (EHJV 2010), or scored as "Moderately-High", "High" or "Highest" in either the breeding or non-breeding conservation and/or monitoring needs for waterfowl conservation region 3 (analogous to BCR 3) of NAWMP (NAWMP Plan Committee 2004).
[5] Species added by the Newfoundland and Labrador Technical Working Group.
[6] The interim population objective for this species will be replaced with the official recovery objectives when recovery documents are published under the *Species at Risk Act*.

Table 1 continued

Priority Species	Bird Group	Population Objective	SARA[1]	COSEWIC[2]	Provincial Listing[3]	National/Continental Concern	National/Continental Stewardship	Regional/Subregional Concern	Regional/Subregional Stewardship	Waterfowl[4]	Expert Review[5]
Least Sandpiper[7]	Shorebirds	Assess/Maintain				Y					
Semipalmated Sandpiper	Shorebirds	Assess/Maintain				Y					
Common Loon	Waterbirds	Assess/Maintain				Y					
Red-throated Loon	Waterbirds	Assess/Maintain							Y		
Canada Goose (North Atlantic)	Waterfowl	Increase 50%								EHJV, NAWMP	
Harlequin Duck (Eastern)	Waterfowl	Assess /Maintain	SC	SC	VU					EHJV, NAWMP	
Long-tailed Duck	Waterfowl	Assess/Maintain								EHJV, NAWMP	

[7] The shorebird priority species were selected based on Andres 2009. A recent assessment (Andres et al. 2012) now suggests that the populations of the Least Sandpiper are stable. Subsequent database versions will be modified to account for this new information.

Table 4. Relative magnitude of identified threats to priority bird species within BCR 3 NL by threat category and broad habitat class.
Overall ranks were generated through a roll-up procedure described in Kennedy et al. (2012). L represents Low magnitude threats; M = Medium; H = High; VH = Very High. Blank cells indicate that no priority species had threats identified in the threat category/habitat combination.

Threat Category	Habitat Class							
	Shrub/early successional	Lichens/mosses	Bare areas	Wetlands	Riparian	Waterbodies, snow and ice	Coastal (above high tide)	**Overall**
Overall	**H**	**M**	**M**	**H**	**H**	**M**	**H**	
1. Residential and commercial development								
2. Agriculture and aquaculture								
3. Energy production and mining								
4. Transportation and service corridors	L			L	L			L
5. Biological resource use	L	L	L	L	L	L	L	L
6. Human intrusions and disturbance	L		L		L		L	L
7. Natural system modifications								
8. Invasive and other problematic species and genes	L			L		L	L	L
9. Pollution				L	L	L	L	L
11. Climate change and severe weather	H	M	M	H	H	M	H	H
12. Other direct threats	VH	H	M	H	H	M	VH	VH

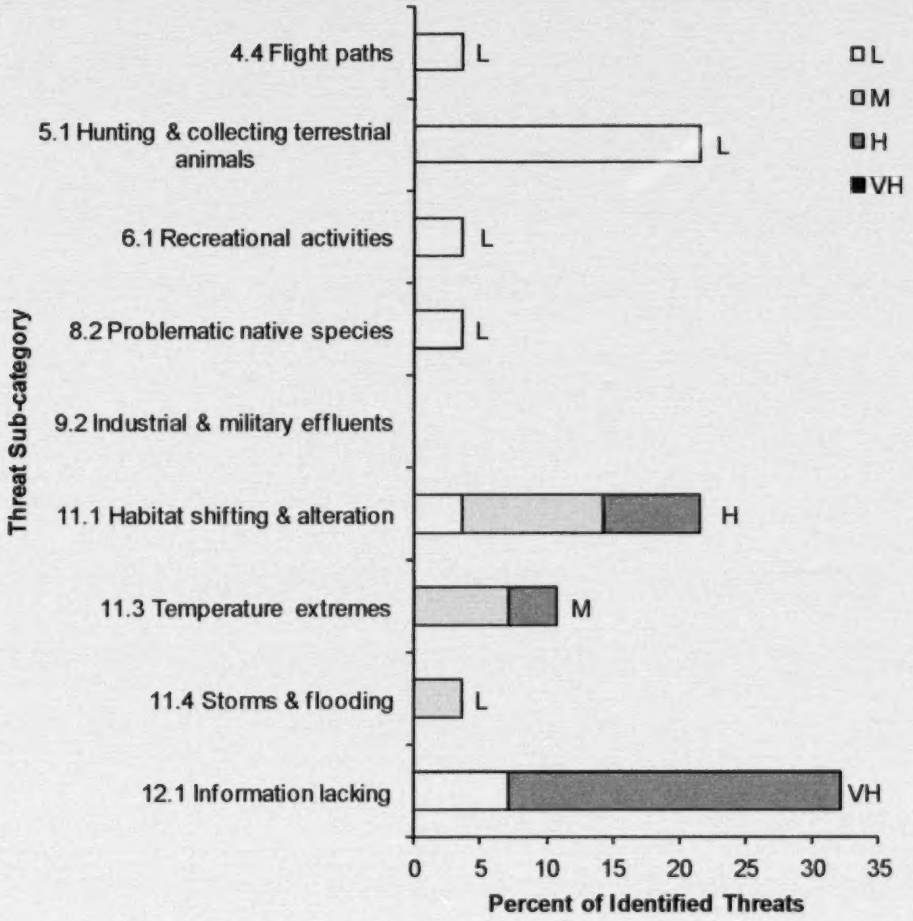


Figure 9. Percent of identified threats to priority bird species in shrub/early successional habitats for each threat sub-category in BCR 3 NL.

Each bar represents the percent of the total number of threats identified for each sub-category in shrub/early successional habitats (for example, if 100 threats were identified in total for all priority bird species in shrub/early successional habitats, and 10 of those threats were in the sub-category 1.1 Housing and urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in shrub/early successional habitats is shown at the end of each bar (also presented in Table 4 Relative magnitude of identified threats to priority bird species within BCR 3 NL by threat category and broad habitat class).

Note: Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

Lichens/Mosses

In BCR 3 NL, lichens/mosses habitats are found throughout the region and are characterized by vegetated tundra, sedge meadows and rocky outcrops (Fig. 10).

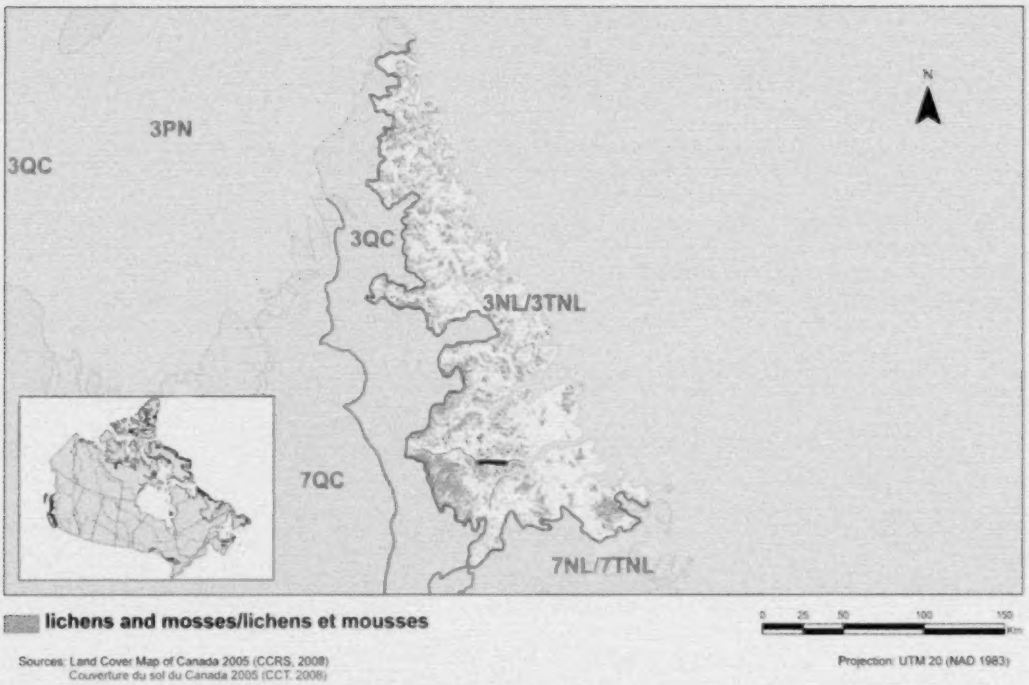


Figure 10. Map of lichens and mosses habitat in BCR 3 NL.

There are four priority bird species found in the lichens/mosses habitat of BCR 3 NL (Table 6); three landbirds and one shorebird. Of these, only the Peregrine Falcon (*anatum/tundrius*) is a species at risk. All species are found in the low tundra habitat sub-class (Table 6).

The highest-ranked threat identified for priority bird species found in the lichens/mosses habitat in BCR 3 NL was the gap in knowledge of species' distributions, abundance and population trends (12.1 Information lacking; ranked high; Fig. 11). The second-highest ranked threat was habitat degradation from changes in habitat structure (e.g., drying, thawing of tundra) or food webs, shifts in species' ranges and altered timing of seasonal cues (e.g., egg laying) due to climate change (11.1 Habitat shifting and alteration; ranked medium; Fig. 11).

The development and implementation of monitoring programs is recommended to address knowledge gaps regarding the distribution, abundance and population trends of priority bird species (see "Research and Population Monitoring Needs"). Recommended conservation actions to address climate change are presented in the "Widespread Issues" section of this document (see "Climate Change"). Conservation actions for low-ranked threats to priority bird species in lichens/mosses habitat are available in the database but are not presented in this document.

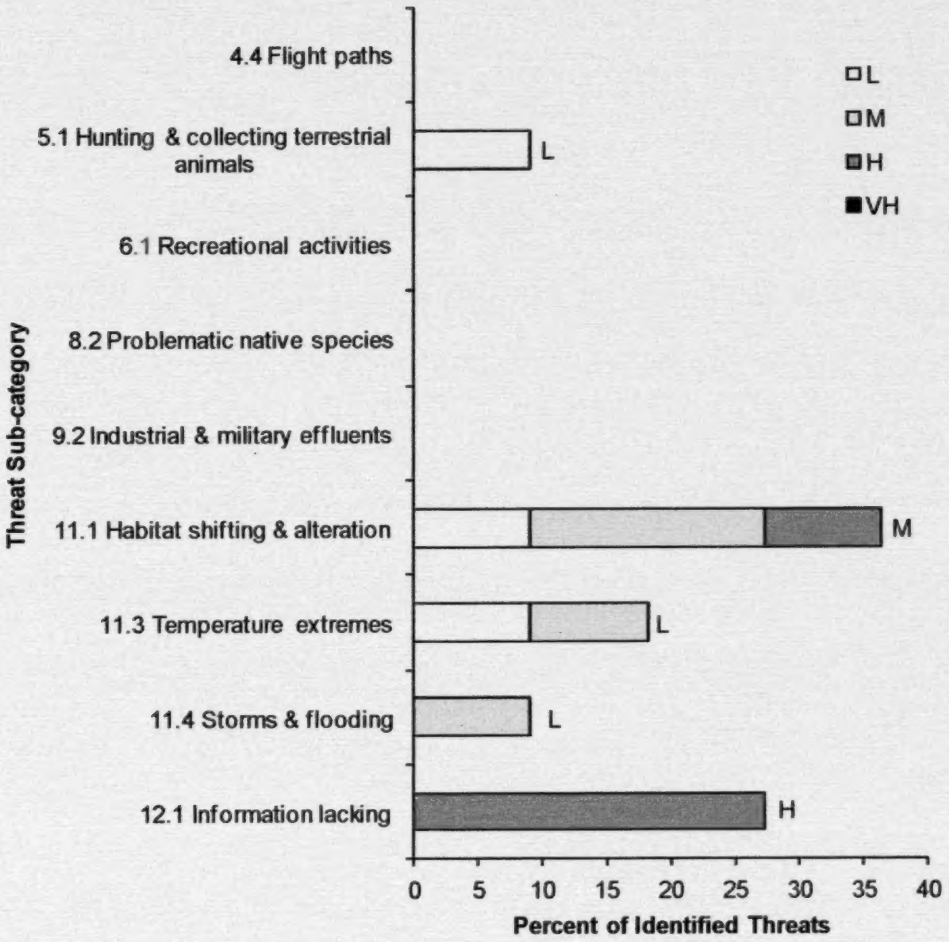


Figure 11. Percent of identified threats to priority bird species in lichens/mosses habitat for each threat sub-category in BCR 3 NL.

Each bar represents the percent of the total number of threats identified for each sub-category in lichens/mosses habitat (for example, if 100 threats were identified in total for all priority bird species in lichens/mosses habitat, and 10 of those threats were in the sub-category 1.1 Housing and urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in lichens/mosses habitat is shown at the end of each bar (also presented in Table 4 Relative magnitude of identified threats to priority bird species within BCR 3 NL by threat category and broad habitat class).

Note: Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

Bare Areas

In BCR 3 NL, bare areas are characterized by bare soil, rocky outcrops and cliffs (Fig. 12).

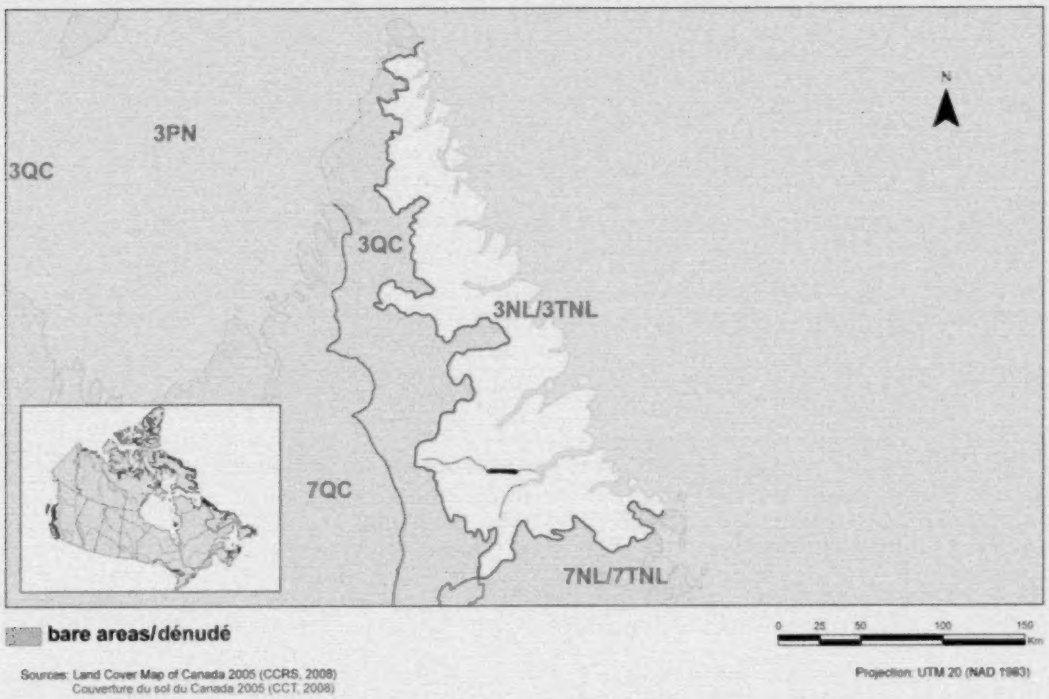


Figure 12. Map of bare areas in BCR 3 NL.

There are four priority bird species found in bare areas in BCR 3 NL (Table 7); all are landbirds and none are species at risk. The Golden Eagle and Northern Wheatear are found exclusively in bare areas whereas the Gyrfalcon uses the non-specific tundra habitat sub-class, and the Snow Bunting is associated with inland bare areas (Table 7).

The highest-ranked threat identified for priority bird species in bare areas of BCR 3 NL was the gap in knowledge of species' distributions, abundance and population trends (12.1 Information lacking; ranked high; Fig. 13). Other important threats were habitat degradation or reductions in survival due to thermal stress as a result of climate change (11.3 Temperature extremes; ranked medium) or severe weather (11.4 Storms and flooding; ranked medium; Fig. 13). Also, changes in species' ranges resulting in occupancy of degraded or less suitable habitats and changes in the timing of seasonal cues such as egg laying (both as a result of climate change) were frequently identified threats to priority bird species in this habitat, although they were ranked as low (11.1 Habitat shifting and alteration; Fig. 13).

The development and implementation of monitoring programs is recommended to address knowledge gaps regarding the distribution, abundance and population trends of priority bird species (see "Research and Population Monitoring Needs"). Recommended conservation

actions to address climate change are presented in the "Widespread Issues" section of this document (see "Climate Change"). Conservation actions for low-ranked threats to priority bird species in bare areas are available in the database but are not presented in this document.

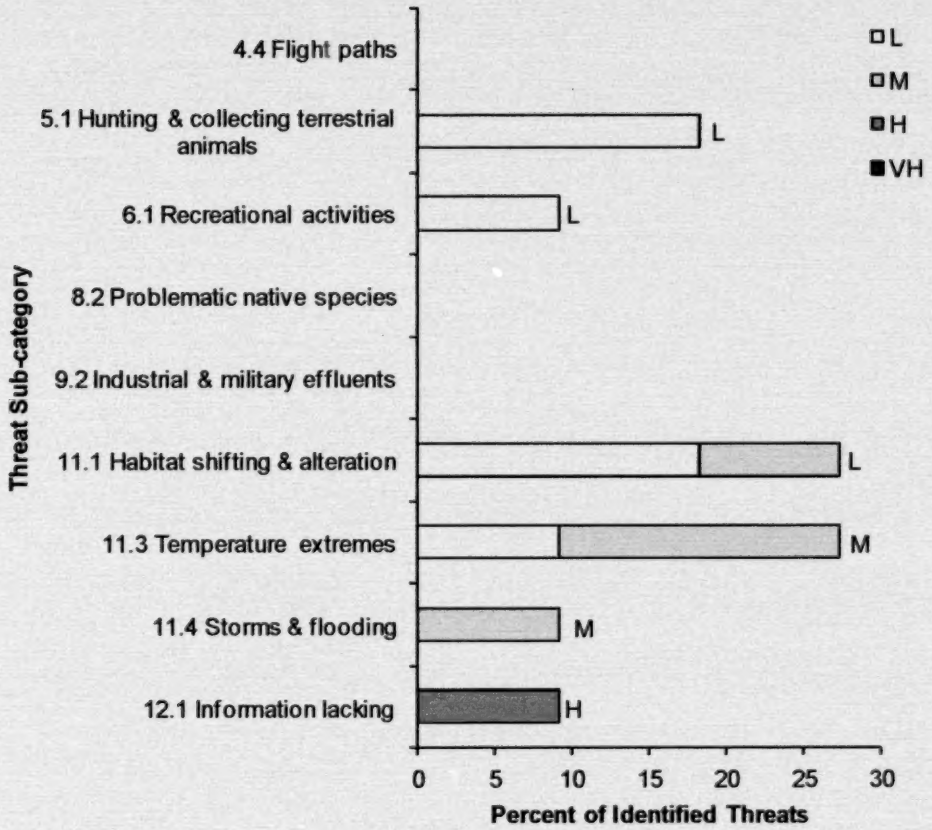


Figure 13. Percent of identified threats to priority bird species in bare areas for each threat sub-category in BCR 3 NL.

Each bar represents the percent of the total number of threats identified for each sub-category in bare areas (for example, if 100 threats were identified in total for all priority bird species in bare areas, and 10 of those threats were in the sub-category 1.1 Housing and urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in bare areas is shown at the end of each bar (also presented in Table 4 Relative magnitude of identified threats to priority bird species within BCR 3 NL by threat category and broad habitat class). **Note:** Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

Wetlands

In BCR 3 NL, wetland habitats are found at both low and high elevations and are characterized by emergent vegetation and standing water (Fig. 14).

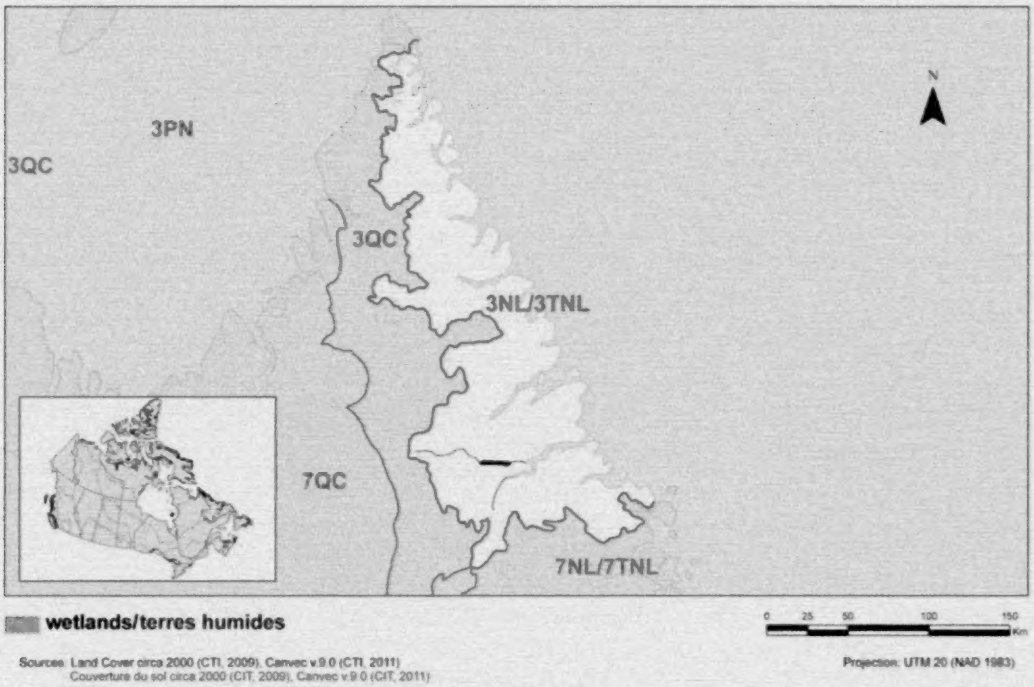


Figure 14. Map of wetland habitats in BCR 3 NL.

There are seven priority bird species found in wetland habitats in BCR 3 NL (Table 8); two waterfowl, one waterbird, two shorebirds and two landbirds. Of these, only the Short-eared Owl is a species at risk. All but one priority bird species are found in either fens or bogs; the Red-throated Loon uses non-specific freshwater wetlands (Table 8). Four priority bird species are associated exclusively with one habitat sub-class, while the remaining three can be found in both bogs and fens (Tables 8).

The highest-ranked threats (both ranked high) identified for priority bird species in wetland habitats of BCR 3 NL were the gap in knowledge of species' distributions, abundance and population trends (12.1 Information lacking); and habitat loss or degradation from changes in habitat structure (e.g., drying, thawing of tundra) or food webs, shifts in species' ranges and altered timing of seasonal cues (e.g., egg laying) due to climate change (11.1 Habitat shifting and alteration; Fig. 15). Also, hunting, poaching and incidental take was a frequently identified threat to priority bird species in this habitat, although it was ranked as low (5.1 Hunting and collecting terrestrial animals; Fig. 15).

The development and implementation of monitoring programs is recommended to address knowledge gaps regarding the distribution, abundance and population trends of priority bird species (see "Research and Population Monitoring Needs"). Recommended conservation actions to address climate change are presented in the "Widespread Issues" section of this document (see "Climate Change"). Conservation actions for low-ranked threats to priority bird species in wetland habitats are available in the database but are not presented in this document.

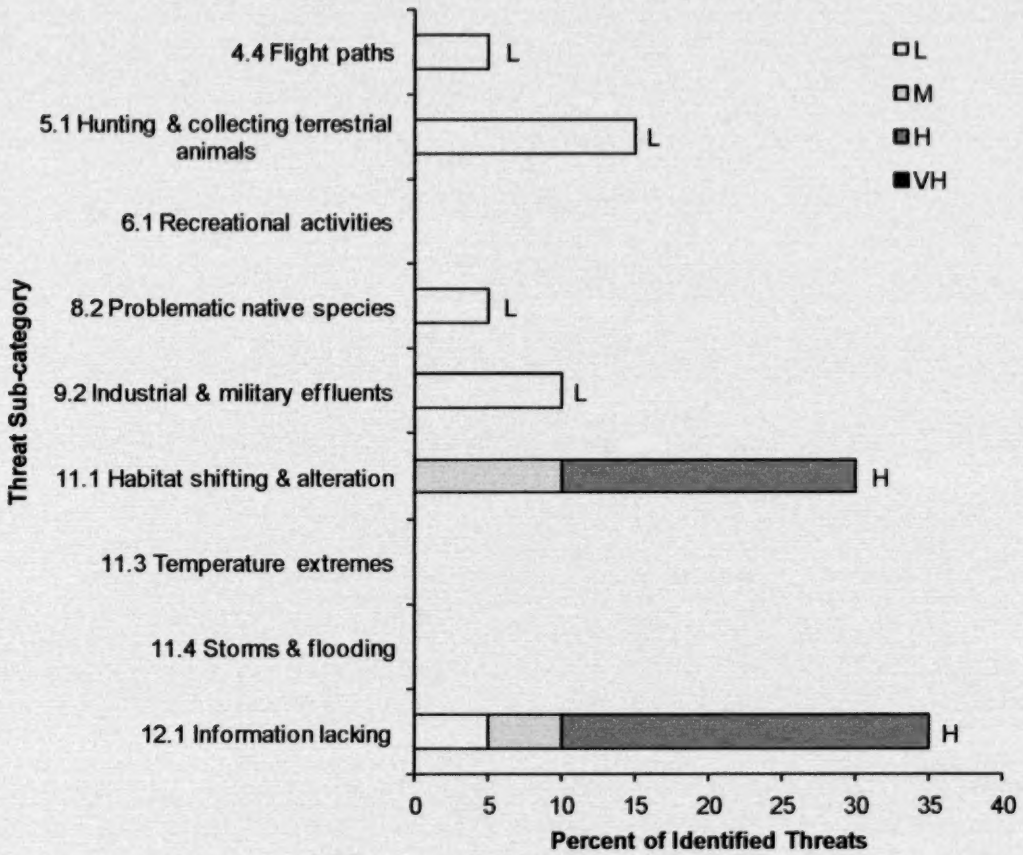


Figure 15. Percent of identified threats to priority bird species in wetland habitats for each threat sub-category in BCR 3 NL.

Each bar represents the percent of the total number of threats identified for each sub-category in wetland habitats (for example, if 100 threats were identified in total for all priority bird species in wetland habitats, and 10 of those threats were in the sub-category 1.1 Housing and urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in wetland habitats is shown at the end of each bar (also presented in Table 4 Relative magnitude of identified threats to priority bird species within BCR 3 NL by threat category and broad habitat class).

Note: Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

Riparian

Riparian areas are the transition zone where land encounters water along rivers, streams, lakes, ponds and/or estuaries. These areas might be treed, shrubby or herbaceous, depending on site conditions. In BCR 3 NL, riparian habitats are characterized by forested river valleys, sandy margins of lakes and ponds, upland tundra draining into standing water, and other areas close to waterbodies (Fig. 16).

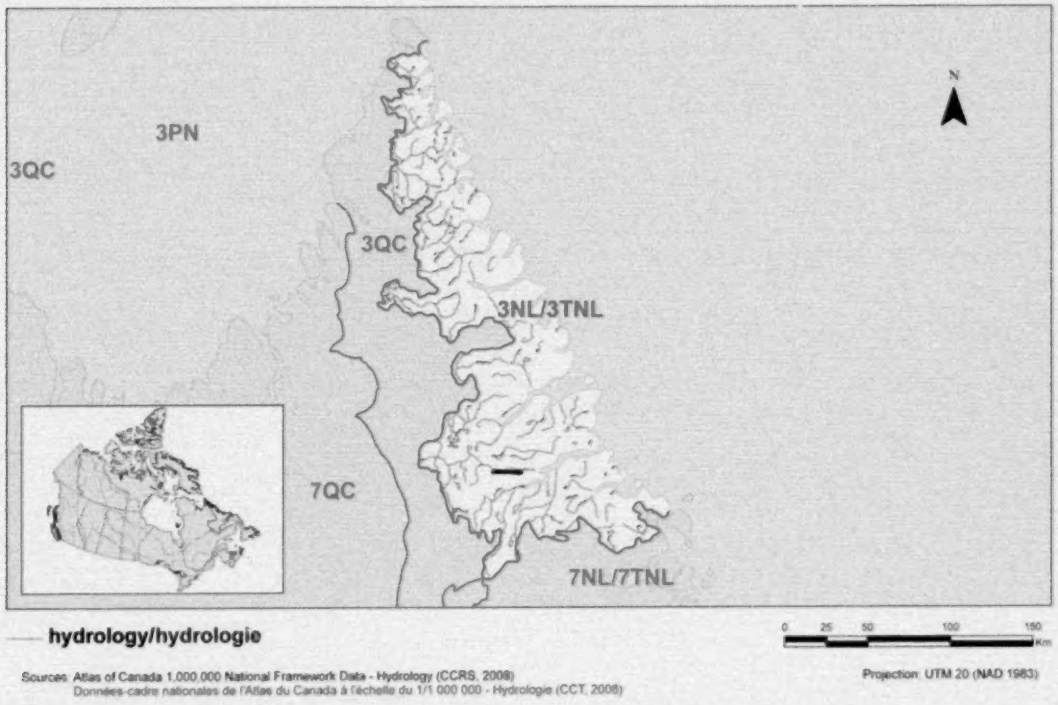


Figure 16. Map of riparian habitats in BCR 3 NL.

There are seven priority bird species found in riparian habitats in BCR 3 NL (Table 9); two shorebirds and five landbirds. Of these, only the Peregrine Falcon (*anatum/tundrius*) is a species at risk. All the priority bird species are found exclusively in bare areas with the exception of the Semipalmated Sandpiper that can also be found in the low tundra habitat sub-class (Table 9).

The highest-ranked threats identified for priority bird species in riparian habitats of BCR 3 NL (all ranked high) were habitat loss or degradation from changes in habitat structure (e.g., drying) or food webs, shifts in species' ranges and altered timing of seasonal cues (e.g., egg laying) due to climate change (11.1 Habitat shifting and alteration); as well as the gap in knowledge of species' distributions, abundance and population trends (12.1 Information lacking; Fig. 17). Another frequently identified threat to priority birds species in this habitat was the reduction in survival due to poaching and incidental take (such as falconry, egg collection

Table 5. Priority species in BCR 3 NL that use shrub/early successional habitats, regional habitat sub-class, important habitat features, population objectives and reason for priority status.

Priority Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR[1]	N/CC[2]	N/CS[3]	R/SC[4]	R/SS[5]	NAWMP/ EHJV[6]	Review[7]
American Golden-Plover	inland barrens	low vegetation on dry rocky slopes, snow free	Assess/Maintain		Y					
Canada Goose (North Atlantic)	inland barrens	dwarf willows, barrens	Increase 50%						Y	
Golden Eagle	inland barrens; non-specific tundra		Maintain current					Y		
Gray-cheeked Thrush	non-specific tundra	alder/willow thickets	Assess/Maintain	Y						
Gyrfalcon	inland barrens; non-specific tundra	taiga/tundra transitional zone; steep cliffs along marine coasts	Maintain current			Y		Y		
Northern Wheatear	inland barrens	narrow sheltered crevices, shrubs, rocky, dry	Maintain current			Y		Y		
Peregrine Falcon (*anatum/tundrius*)	inland barrens	steep cliffs, crevices	Assess/Maintain	Y				Y		
Rough-legged Hawk	non-specific tundra	open tundra for foraging	Maintain current			Y		Y		
Semipalmated Sandpiper	inland barrens	dry ridges, shrubs, sedges, graminoids, rocky areas, grassy hummocks, peat bogs, berry bearing plants	Assess/Maintain		Y					
Short-eared Owl	non-specific tundra	small willows, open, small mammal abundance	Assess/Maintain	Y						
Snowy Owl	inland barrens; non-specific tundra	coastal	Maintain current					Y		

[1] "SAR" (species at risk) includes species considered Endangered, Threatened or of Special Concern pursuant to an assessment by COSEWIC; listed on Schedule 1 of SARA as Endangered, Threatened or of Special Concern; or listed as Endangered, Threatened or Vulnerable under Newfoundland and Labrador's *Endangered Species Act*.

[2] N/CC: species considered of National or Continental Concern.

[3] N/CS: species considered of National or Continental Stewardship.

[4] R/SC: species of Regional or Subregional Concern.

[5] R/SS: species of Regional or Subregional Stewardship.

[6] NAWMP/EHJV: waterfowl that are priority under the regional EHJV Implementation Plan (EHJV 2010), or scored "Moderately-High", "High" or "Highest" in WCR 3 of the NAWMP (NAWMP Committee 2004).

[7] Review: added by the Newfoundland and Labrador Technical Working Group. For further details on reasons for priority status and the species prioritization process, see Table 1 and Element 1: Priority Species Assessment in Appendix 2.

Table 6. Priority species in BCR 3 NL that use lichens/mosses habitat, regional habitat sub-class, important habitat features, population objectives and reason for priority status.

Priority Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR[1]	N/CC[2]	N/CS[3]	R/SC[4]	R/SS[5]	NAWMP/ EHJV[6]	Review[7]
Least Sandpiper	low tundra	moist sedge meadows and tundra	Assess/Maintain		Y					
Northern Wheatear	low tundra	narrow sheltered crevices, elevated, dry tundra, rocky	Maintain current			Y		Y		
Peregrine Falcon (*anatum/tundrius*)	low tundra	open	Assess/Maintain	Y				Y		
Snow Bunting	low tundra	vegetated tundra, nunataks	Maintain current			Y				

[1] "SAR" (species at risk) includes species considered Endangered, Threatened or of Special Concern pursuant to an assessment by COSEWIC; listed on Schedule 1 of SARA as Endangered, Threatened or of Special Concern; or listed as Endangered, Threatened or Vulnerable under Newfoundland and Labrador's *Endangered Species Act*.
[2] N/CC: species considered of National or Continental Concern.
[3] N/CS: species considered of National or Continental Stewardship.
[4] R/SC: species of Regional or Subregional Concern.
[5] R/SS: species of Regional or Subregional Stewardship.
[6] NAWMP/EHJV: waterfowl that are priority under the regional EHJV Implementation Plan (EHJV 2010), or scored "Moderately-High", "High" or "Highest" in WCR 3 of the NAWMP (NAWMP Committee 2004).
[7] Review: added by the Newfoundland and Labrador Technical Working Group. For further details on reasons for priority status and the species prioritization process, see Table 1 and Element 1: Priority Species Assessment in Appendix 2.

Table 7. Priority species in BCR 3 NL that use bare areas, regional habitat sub-class, important habitat features, population objectives and reason for priority status.

Priority Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR[1]	N/CC[2]	N/CS[3]	R/SC[4]	R/SS[5]	NAWMP/ EHJV[6]	Review[7]
Golden Eagle	bare areas	steep cliffs with overhang	Maintain current					Y		
Gyrfalcon	non-specific tundra		Maintain current			Y		Y		
Northern Wheatear	bare areas	narrow, sheltered crevices	Maintain current			Y		Y		
Snow Bunting	inland bare areas	early thawing, standing water, near vegetated tundra	Maintain current			Y				

[1] "SAR" (species at risk) includes species considered Endangered, Threatened or of Special Concern pursuant to an assessment by COSEWIC; listed on Schedule 1 of SARA as Endangered, Threatened or of Special Concern; or listed as Endangered, Threatened or Vulnerable under Newfoundland and Labrador's *Endangered Species Act*.
[2] N/CC: species considered of National or Continental Concern.
[3] N/CS: species considered of National or Continental Stewardship.
[4] R/SC: species of Regional or Subregional Concern.
[5] R/SS: species of Regional or Subregional Stewardship.
[6] NAWMP/EHJV: waterfowl that are priority under the regional EHJV Implementation Plan (EHJV 2010), or scored "Moderately-High", "High" or "Highest" in WCR 3 of the NAWMP (NAWMP Committee 2004).
[7] Review: added by the Newfoundland and Labrador Technical Working Group. For further details on reasons for priority status and the species prioritization process, see Table 1 and Element 1: Priority Species Assessment in Appendix 2.

Table 8. Priority species in BCR 3 NL that use wetland habitats, regional habitat sub-class, important habitat features, population objectives and reason for priority status.

Priority Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR[1]	N/CC[2]	N/CS[3]	R/SC[4]	R/SS[5]	NAWMP/ EHJV[6]	Review[7]
Canada Goose (North Atlantic)	bog; fen	muddy bottoms, emergent vegetation, lowland sedge/grass meadows, islands	Increase 50%						Y	
Least Sandpiper	bog; fen	freshwater, flooded grassy fields	Assess/Maintain		Y					
Long-tailed Duck	bog; fen	arctic and sub-arctic, open water, emergent vegetation, low elevations, shallow, islands in freshwater ponds, tundra	Assess/Maintain						Y	
Red-throated Loon	non-specific freshwater wetlands	low elevation wetlands (bog, fen, low lying shores of marsh), string bog, small lakes or ponds within wetlands or heathlands	Assess/Maintain					Y		
Semipalmated Sandpiper	bog	sedge-grass or heath, rocky areas, grassy hummocks, peat bogs, berry bearing plants	Assess/Maintain		Y					
Short-eared Owl	bog	near open forests, small mammal abundance	Assess/Maintain	Y						
Snowy Owl	bog		Maintain current					Y		

[1] "SAR" (species at risk) includes species considered Endangered, Threatened or of Special Concern pursuant to an assessment by COSEWIC; listed on Schedule 1 of SARA as Endangered, Threatened or of Special Concern; or listed as Endangered, Threatened or Vulnerable under Newfoundland and Labrador's *Endangered Species Act*.
[2] N/CC: species considered of National or Continental Concern.
[3] N/CS: species considered of National or Continental Stewardship.
[4] R/SC: species of Regional or Subregional Concern.
[5] R/SS: species of Regional or Subregional Stewardship.
[6] NAWMP/EHJV: waterfowl that are priority under the regional EHJV Implementation Plan (EHJV 2010), or scored "Moderately-High", "High" or "Highest" in WCR 3 of the NAWMP (NAWMP Committee 2004).
[7] Review: added by the Newfoundland and Labrador Technical Working Group. For further details on reasons for priority status and the species prioritization process, see Table 1 and Element 1: Priority Species Assessment in Appendix 2.

and nestlings), although it was ranked as low (5.1 Hunting and collecting terrestrial animals; Fig. 17).

Recommended conservation actions to address climate change are presented in the "Widespread Issues" section of this document (see "Climate Change"). The development and implementation of monitoring programs is recommended to address knowledge gaps regarding the distribution, abundance and population trends of priority bird species (see "Research and Population Monitoring Needs"). Conservation actions for low-ranked threats to priority bird species in riparian habitats are available in the database but are not presented in this document.

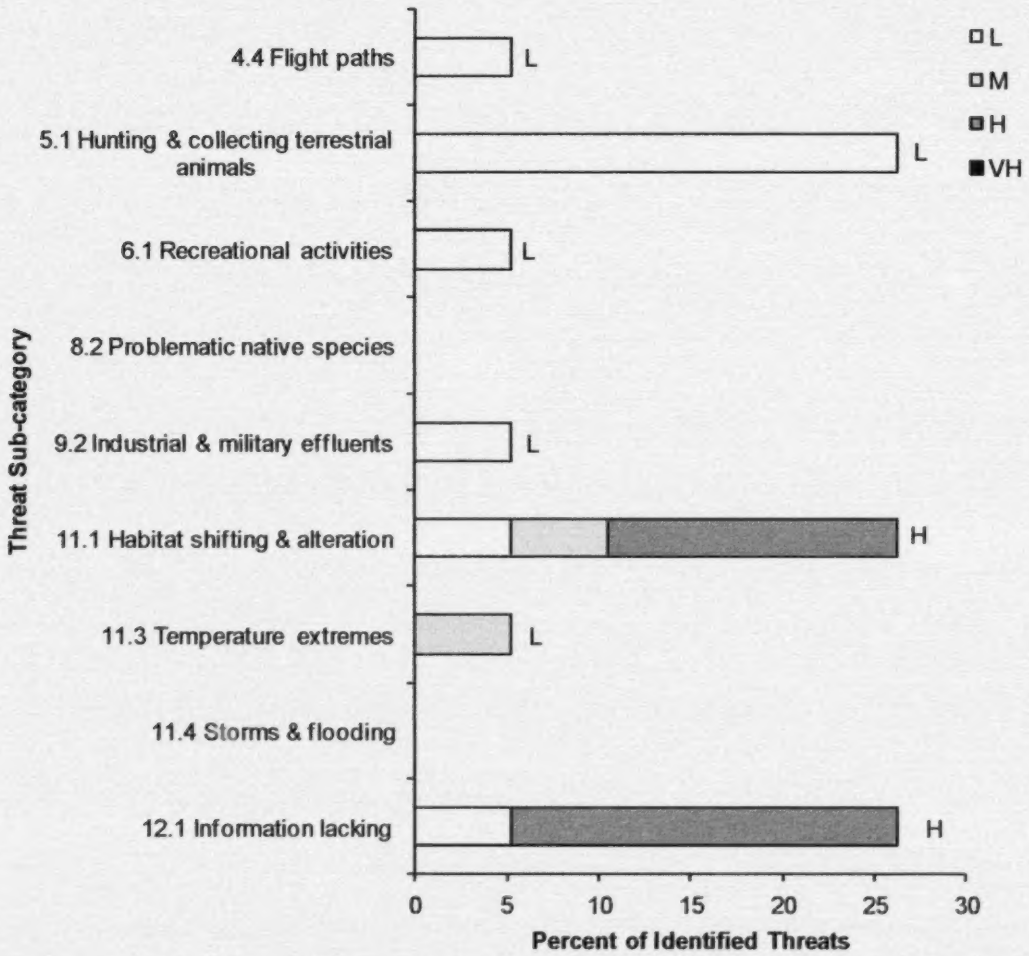


Figure 17. Percent of identified threats to priority bird species in riparian habitats for each threat sub-category in BCR 3 NL.

Each bar represents the percent of the total number of threats identified for each sub-category in riparian habitats (for example, if 100 threats were identified in total for all priority bird species in riparian habitats, and 10 of those threats were in the sub-category 1.1 Housing and urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in riparian habitats is shown at the end of each bar (also presented in Table 4 Relative magnitude of identified threats to priority bird species within BCR 3 NL by threat category and broad habitat class).

Note: Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

Waterbodies, Snow and Ice

In BCR 3 NL, the waterbodies, snow and ice habitat category includes freshwater lakes, ponds, rivers and streams as well as areas covered by snow and/or ice for a large period of time throughout the year (Fig. 18).

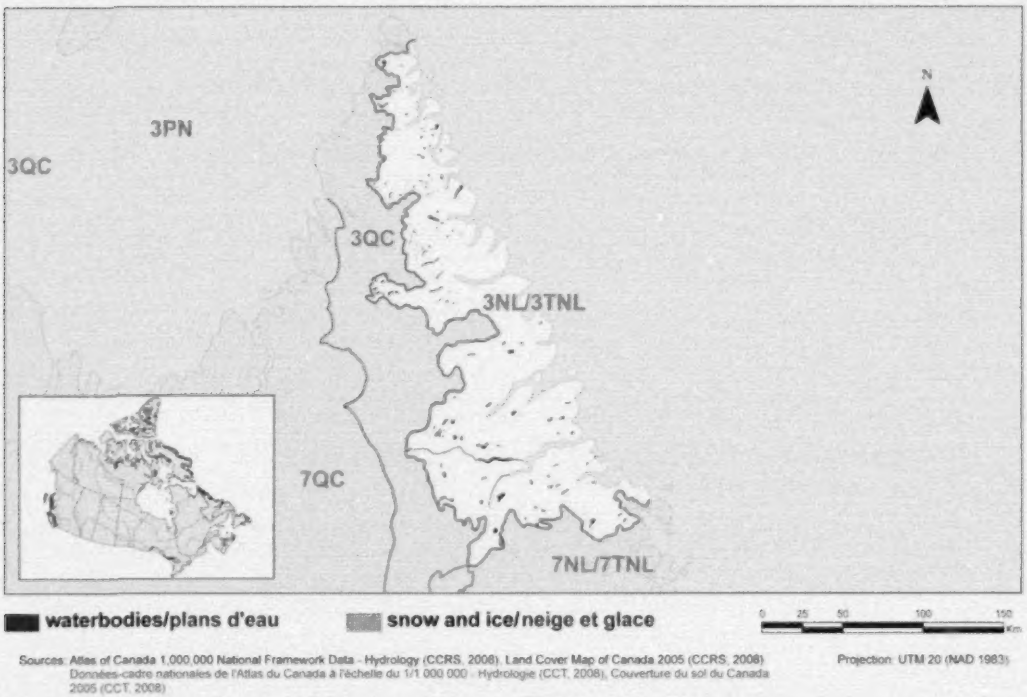


Figure 18. Map of waterbodies, snow and ice in BCR 3 NL; this region does not extend in the marine waters.

There are five priority bird species found in the waterbodies, snow and ice habitat category of BCR 3 NL (Table 10); three waterfowl and two waterbirds. The Harlequin Duck (Eastern) is the only species at risk. Priority bird species are found in either lakes/ponds or rivers/streams (Table 10). Four priority bird species are associated exclusively with one habitat sub-class, while the Common Loon can be found in both lakes/ponds and/or rivers/streams (Table 10).

The highest-ranked threats (both ranked medium) identified for priority bird species in the waterbodies, snow and ice habitat category of BCR 3 NL were habitat loss or degradation from changes in habitat structure such as drying, thawing of tundra and altered hydrologic regimes due to climate change (11.1 Habitat shifting and alteration); and the gap in knowledge of species' distributions, abundance and population trends (12.1 Information lacking; Fig. 19). Reductions in survival of due to hunting, poaching and incidental take was also a frequently identified threat to priority bird species in this habitat, although it was ranked as low (5.1 Hunting and collecting terrestrial animals; Fig. 19).

The development and implementation of monitoring programs is recommended to address knowledge gaps regarding the distribution, abundance and population trends of priority bird species (see "Research and Population Monitoring Needs"). Recommended conservation actions to address climate change are presented in the "Widespread Issues" section of this document (see "Climate Change"). Conservation actions for low-ranked threats to priority bird species in the waterbodies, snow and ice habitat category are available in the database but are not presented in this document.

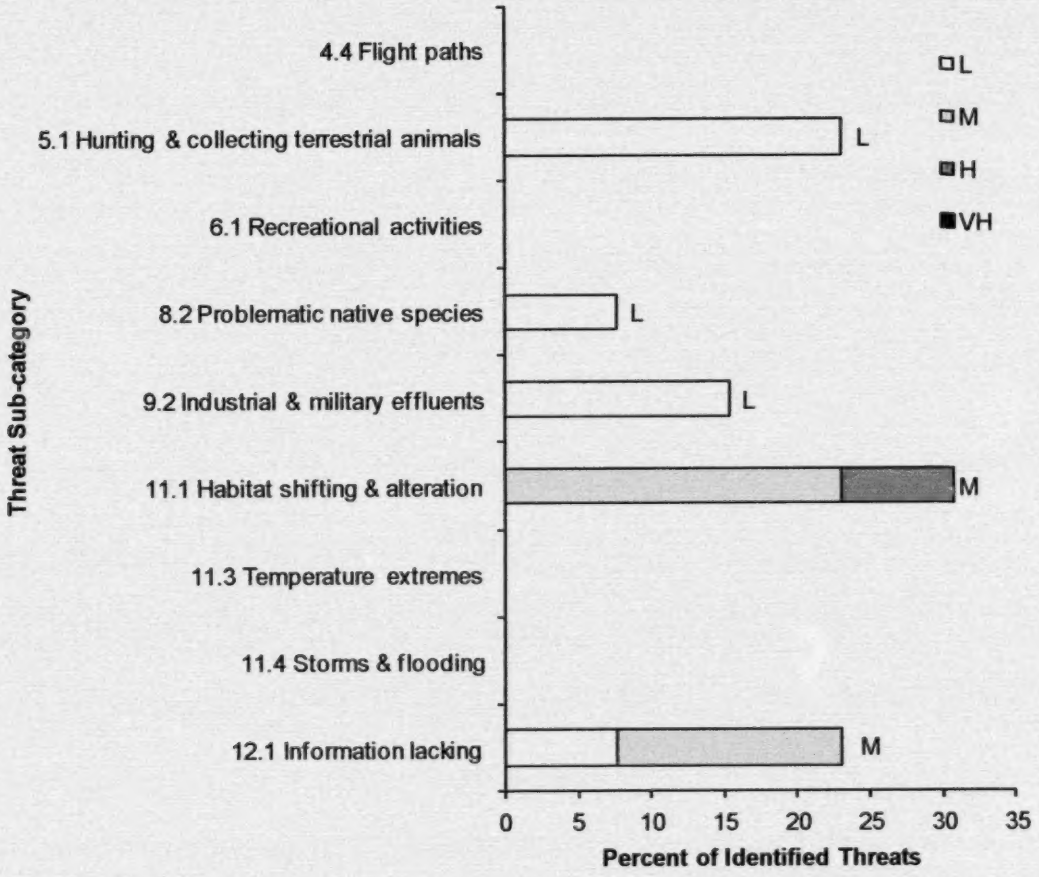


Figure 19. Percent of identified threats to priority bird species in the waterbodies, snow and ice habitat category for each threat sub-category in BCR 3 NL.

Each bar represents the percent of the total number of threats identified for each sub-category in waterbodies, snow and ice (for example, if 100 threats were identified in total for all priority bird species in waterbodies, snow and ice, and 10 of those threats were in the sub-category 1.1 Housing and urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in waterbodies, snow and ice is shown at the end of each bar (also presented in Table 4 Relative magnitude of identified threats to priority bird species within BCR 3 NL by threat category and broad habitat class).

Note: Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

Coastal Areas (Above High Tide)

In BCR 3 NL, coastal (above high tide) habitat includes beaches, estuaries, saltmarshes and bare areas bordering large bodies of water and do not extend below the high tide line (Fig. 20). The MBU 10 NL planning unit in the BCR 7 NL strategy should be consulted for information on conservation actions for priority birds below the high tide line (Bird Conservation Strategy for Bird Conservation Region 7 and Marine Biogeographic Unit 10 in Newfoundland and Labrador: Taiga Shield and Hudson Plains, and Newfoundland-Labrador Shelves – Environment Canada 2013).

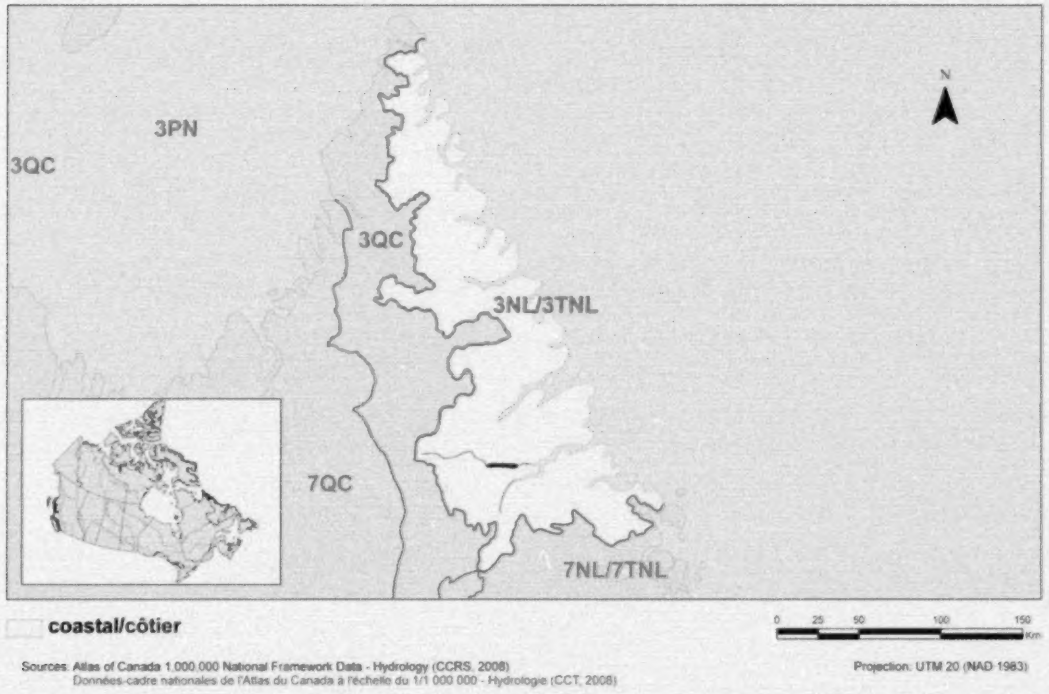


Figure 20. Map of coastal (above high tide) habitats in BCR 3 NL. The coastal habitat does not extend below the high tide line.

There are 10 priority bird species found in coastal (above high tide) habitats of BCR 3 NL (Table 11); 2 waterfowl, 1 waterbirds, 3 shorebirds and 5 landbirds. Of these, 3 are species at risk. Priority bird species are found in estuaries, saltmarshes, beaches, islands and bare areas (Table 11). All but 2 priority bird species are associated exclusively with 1 habitat sub-class; the American Golden-Plover uses both beaches and estuaries while the Gyrfalcon can be found in beaches, estuaries, saltmarshes and/or islands (Table 11).

The highest-ranked threat identified for priority bird species in coastal (above high tide) habitats of BCR 3 NL was the gap in knowledge of species' distributions, abundance and population trends (12.1 Information lacking; ranked very high; Fig. 21). The second-highest ranked threat was habitat loss, degradation or reductions in survival from changes in habitat

structure (e.g., drying, thawing of tundra) or food webs, shifts in species' ranges and altered timing of seasonal cues (e.g., egg laying, migration) due to climate change (11.1 Habitat shifting and alteration; ranked high; Fig. 21). Another important threat was habitat degradation due to severe weather leading to sea level rise and increased severity or frequency of storms (11.4 Storms and flooding; ranked medium; Fig. 21). Reductions in survival due to hunting, poaching and incidental take (such as falconry or the collecting of nestlings and eggs) was also a frequently identified threat to priority bird species in this habitat, although it was ranked as low (5.1 Hunting and collecting of terrestrial animals; Fig. 21).

The development and implementation of monitoring programs is recommended to address knowledge gaps regarding the distribution, abundance and population trends of priority bird species (see "Research and Population Monitoring Needs"). Recommended conservation actions to address climate change are presented in the "Widespread Issues" section of this document (see "Climate Change"). Conservation actions for low-ranked threats to priority bird species in coastal (above high tide) habitats are available in the database but are not presented in this document.

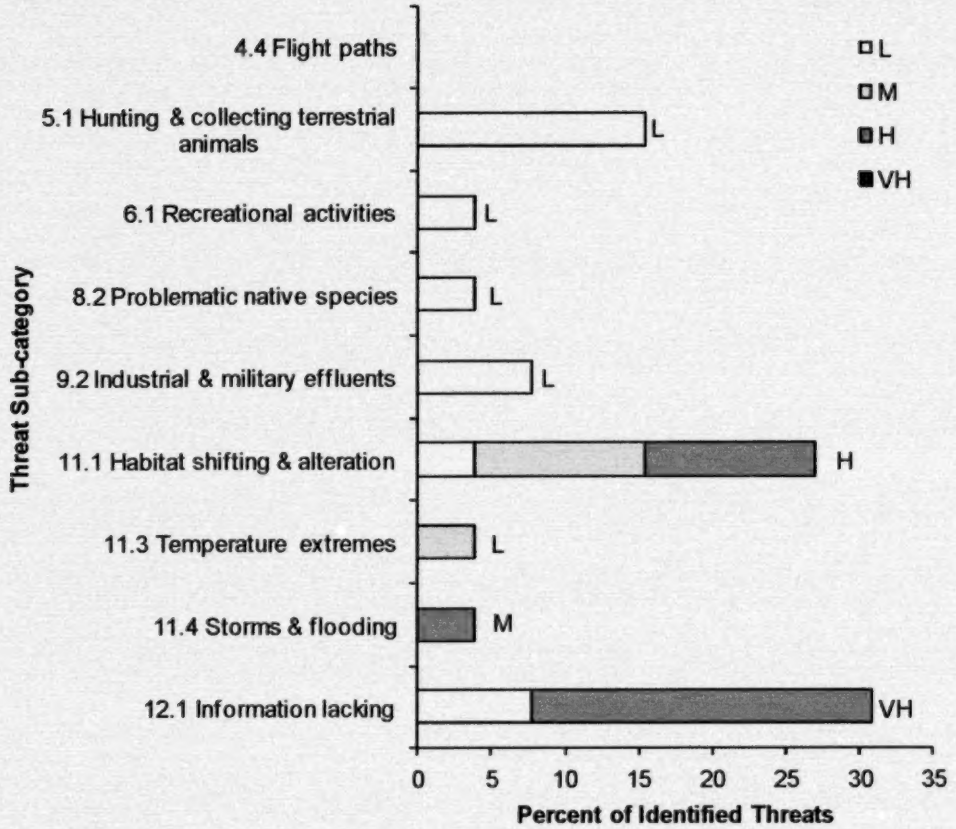


Figure 21. Percent of identified threats to priority bird species in coastal (above high tide) habitats for each threat sub-category in BCR 3 NL.

Each bar represents the percent of the total number of threats identified for each sub-category in coastal (above high tide) habitats (for example, if 100 threats were identified in total for all priority bird species in coastal (above high tide) habitats, and 10 of those threats were in the sub-category 1.1 Housing and urban areas, the bar on the graph would represent this as 10%). The bars are divided to show the distribution of Low (L), Medium (M), High (H) and Very High (VH) rankings of individual threats within each threat sub-category. For example, the same threat may have been ranked H for one species and L for another; the shading illustrates the proportion of L, M, H and VH rankings in the sub-category. The overall magnitude of the sub-threat in coastal (above high tide) habitats is shown at the end of each bar (also presented in Table 4 Relative magnitude of identified threats to priority bird species within BCR 3 NL by threat category and broad habitat class).

Note: Threats of all magnitudes are included, although low-ranked threats affecting only a single species were not assigned conservation objectives or recommended actions.

Section 3: Additional Issues

Widespread Issues

Some well-known conservation issues may not be identified in the literature as significant threats to populations of an individual priority species and therefore may not be captured in the threat assessment. However, these issues, while they may or may not be limiting factors for any individual species or population, contribute to avian mortality or decreases in fecundity across many species and thus warrant conservation attention. Usually these issues transcend habitat types and are considered "widespread". Examples of these issues include:

- collisions with human-made structures (buildings, cars, utility/telecommunications towers and lines, etc.)
- predation by domestic cats
- pollution/pesticides/oil spills
- climate change

Because the widespread issues do not fit into the standard presentation format used in the BCR strategies, they are presented separately here. The mortality estimates included here are largely based on draft reports that were available within Environment Canada when this strategy was produced; the numbers may change as the final scientific papers are peer-reviewed and published. Human-related avian mortality across all sectors was standardized and compared in Calvert et al. 2013.

In BCR 3 NL, the only widespread issues identified as threats for priority bird species were related to pollution (including toxic metals and heavy metals) as well as climate change. This is mainly due to the remote location of the region and the lack of human presence.

Pollution

Pollution caused by industrial chemicals, pesticides and heavy metals can have both direct and indirect effects on survival and reproduction in birds. Sometimes the effects of exposure to pollutants are unexpected and do not result in immediate, measurable impacts on bird populations (Eeva and Lehikoinen 2000, Franceschini et al. 2008, North American Bird Conservation Initiative, U.S. Committee 2009, Mineau 2010). However, persistent exposure can result in sharp declines in bird populations as happened with Peregrine Falcons in eastern Canada prior to the ban of DDT. See Table 12 for conservation objectives and actions.

Toxic Chemicals and Heavy Metals

Toxic organic chemicals and heavy metals released into the environment can also negatively impact bird populations. While some industrial chemicals such as PCBs are regulated, there is concern about new chemicals such as flame retardants (PBDE) that are used in computers, car parts and upholstery and whose effects on wildlife are largely unknown (Environment Canada 2003). Scavengers experience toxic effects when they ingest lead shotgun pellets or bullet fragments embedded in carcasses of game animals, and loons and other waterbirds are exposed to lead from shotgun pellets, sinkers and jigs that they ingest either while collecting grit for their gizzards or by eating bait fish with line and sinker still attached (Scheuhammer and

Norris 1996, Scheuhammer et al. 2003). In some areas, lead poisoning from sinkers and jigs can account for approximately half of the mortality of adult Common Loons on their breeding grounds (Scheuhammer and Norris 1996). Birds are also susceptible to bioaccumulation of other toxic metals such as methylmercury, selenium and others when they consume prey that has been exposed to these substances.

In BCR 3 NL, reductions in survival due to lethal or sublethal toxic effects from chemical contamination such as bioaccumulation of mercury, PCBs and other heavy metals from the consumption of contaminated fish and prey were identified as threats to the Red-throated Loon and Long-tailed Duck in waterbodies and wetland habitats, the Peregrine Falcon (*anatum/tundrius*) in riparian habitats, as well as the Gyrfalcon and Peregrine Falcon (*anatum/tundrius)* in coastal (above high tide) habitats (Table A-3). See Table 12 for conservation objectives and actions.

Table 9. Priority species in BCR 3 NL that use riparian habitats, regional habitat sub-class, important habitat features, population objectives and reason for priority status.

Priority Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR[1]	N/CC[2]	N/CS[3]	R/SC[4]	R/SS[5]	NAWMP/ EHJV[6]	Review[7]
Golden Eagle	bare areas	steep cliffs with overhang	Maintain current					Y		
Gyrfalcon	bare areas	steep cliffs with overhang	Maintain current			Y		Y		
Least Sandpiper	bare areas	margins of lakes, ponds and rivers	Assess/Maintain		Y					
Peregrine Falcon (*anatum/tundrius*)	bare areas	steep cliffs, crevices, river valleys	Assess/Maintain	Y				Y		
Rough-legged Hawk	bare areas	cliffs and elevated rocky outcrops, coastal and riverine, forested river valleys	Maintain current			Y		Y		
Semipalmated Sandpiper	bare areas; low tundra	upland tundra with low vegetation and varying drainage, close to lakes, ponds and streams, sandy areas along rivers	Assess/Maintain		Y					
Snowy Owl	bare areas	elevated areas and promontories	Maintain current					Y		

[1] "SAR" (species at risk) includes species considered Endangered, Threatened or of Special Concern pursuant to an assessment by COSEWIC; listed on Schedule 1 of SARA as Endangered, Threatened or of Special Concern; or listed as Endangered, Threatened or Vulnerable under Newfoundland and Labrador's *Endangered Species Act*.
[2] N/CC: species considered of National or Continental Concern,
[3] N/CS: species considered of National or Continental Stewardship,
[4] R/SC: species of Regional or Subregional Concern,
[5] R/SS: species of Regional or Subregional Stewardship,
[6] NAWMP/EHJV: waterfowl that are priority under the regional EHJV Implementation Plan (EHJV 2010), or scored "Moderately-High", "High" or "Highest" in WCR 3 of the NAWMP (NAWMP Committee 2004),
[7] Review: added by the Newfoundland and Labrador Technical Working Group. For further details on reasons for priority status and the species prioritization process, see Table 1 and Element 1: Priority Species Assessment in Appendix 2.

Table 10. Priority species in BCR 3 NL that use the waterbodies, snow and ice habitat category, regional habitat sub-class, important habitat features, population objectives and reason for priority status.

Priority Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR[1]	N/CC[2]	N/CS[3]	R/SC[4]	R/SS[5]	NAWMP/ EHJV[6]	Review[7]
Canada Goose (North Atlantic)	lakes/ponds	moss covered islets within lake for nesting, string bogs	Increase 50%						Y	
Common Loon	lakes/ponds; rivers/streams	large lakes with rocky and convoluted shoreline, oligotrophic, tundra lakes, floating bogs	Assess/Maintain		Y					
Harlequin Duck (Eastern)	rivers/streams	fast flowing, abundant invertebrates, narrow, large substrates, steep banks	Assess/Maintain	Y					Y	
Long-tailed Duck	lakes/ponds	shallow open water ponds in wetlands and small lakes	Assess/Maintain						Y	
Red-throated Loon	lakes/ponds	shallow, organic bottoms	Assess/Maintain					Y		

[1] "SAR" (species at risk) includes species considered Endangered, Threatened or of Special Concern pursuant to an assessment by COSEWIC; listed on Schedule 1 of SARA as Endangered, Threatened or of Special Concern; or listed as Endangered, Threatened or Vulnerable under Newfoundland and Labrador's *Endangered Species Act*.

[2] N/CC: species considered of National or Continental Concern.

[3] N/CS: species considered of National or Continental Stewardship.

[4] R/SC: species of Regional or Subregional Concern.

[5] R/SS: species of Regional or Subregional Stewardship.

[6] NAWMP/EHJV: waterfowl that are priority under the regional EHJV Implementation Plan (EHJV 2010), or scored "Moderately-High", "High" or "Highest" in WCR 3 of the NAWMP (NAWMP Committee 2004).

[7] Review: added by the Newfoundland and Labrador Technical Working Group. For further details on reasons for priority status and the species prioritization process, see Table 1 and Element 1: Priority Species Assessment in Appendix 2.

Table 11. Priority species in BCR 3 NL that use coastal (above high tide) habitats, regional habitat sub-class, important habitat features, population objectives and reason for priority status.

Priority Species	Habitat Sub-class	Important Habitat Features	Population Objective	Reason for Priority Status						
				SAR[1]	N/CC[2]	N/CS[3]	R/SC[4]	R/SS[5]	NAWMP/ EHJV[6]	Review[7]
American Golden-Plover	beaches; estuaries	beaches and mudflats	Assess/Maintain		Y					
Canada Goose (North Atlantic)	saltmarshes		Increase 50%						Y	
Common Loon	estuaries	abundant fish	Assess/Maintain		Y					
Gyrfalcon	beaches; estuaries; islands; saltmarshes	congregation of shorebirds, waterfowl and gulls, including mudflats	Maintain current			Y		Y		
Harlequin Duck (Eastern)	estuaries		Assess/Maintain	Y					Y	
Least Sandpiper	estuaries	short grasses	Assess/Maintain		Y					
Peregrine Falcon (*anatum/tundrius*)	bare areas	steep cliffs, crevices, islands	Assess/Maintain	Y				Y		
Semipalmated Sandpiper	beaches	sand dunes, scattered water bodies	Assess/Maintain		Y					
Short-eared Owl	bare areas	above treeline, open, small mammal abundance	Assess/Maintain	Y						
Snow Bunting	bare areas	exposed grasses	Maintain current			Y				

[1] "SAR" (species at risk) includes species considered Endangered, Threatened or of Special Concern pursuant to an assessment by COSEWIC; listed on Schedule 1 of SARA as Endangered, Threatened or of Special Concern; or listed as Endangered, Threatened or Vulnerable under Newfoundland and Labrador's *Endangered Species Act*.
[2] N/CC: species considered of National or Continental Concern
[3] N/CS: species considered of National or Continental Stewardship
[4] R/SC: species of Regional or Subregional Concern
[5] R/SS: species of Regional or Subregional Stewardship
[6] NAWMP/EHJV: waterfowl that are priority under the regional EHJV Implementation Plan (EHJV 2010), or scored "Moderately-High", "High" or "Highest" in WCR 3 of the NAWMP (NAWMP Committee 2004)
[7] Review: added by the Newfoundland and Labrador Technical Working Group. For further details on reasons for priority status and the species prioritization process, see Table 1 and Element 1: Priority Species Assessment in Appendix 2.

Table 12. Conservation objectives and actions associated with bird mortality from contaminants in BCR 3 NL.

Threats Addressed	Threat Category	Objective	Objective Category	Recommended Actions	Action Category	Priority Species Affected
Environmental Contaminants						
Mortality from heavy metals and other contaminants.	9.2 Industrial and military effluents	Reduce mortality from heavy metals and other contaminants	2.2 Reduce mortality and/or sub-lethal effects from exposure to contaminants.	Work with industry and policy makers to reduce the quantity of heavy metals and other contaminants released into the environment.	5.3 Private sector standards and codes 5.2 Policies and regulations	All species But specifically noted in the threat assessment process for: Gyrfalcon Long-tailed Duck Peregrine Falcon (*anatum/tundrius*) Red-throated Loon

Climate Change

The effects of climate change are already measurable in many bird habitats and have resulted in range shifts and changes in the timing of migration and breeding in some species (National Audubon Society 2009, North American Bird Conservation Initiative, U.S. Committee 2009). Birds in all habitats will be affected by climate change. The most vulnerable are predicted to be those that are dependent on oceanic ecosystems and those found in coastal, island, grassland, arctic and alpine habitats (North American Bird Conservation Initiative, U.S. Committee 2010). Changing climate may also facilitate the spread of disease, the introduction of new predators and the invasion of non-native species that alter habitat structure and community composition (North American Bird Conservation Initiative, U.S. Committee 2009, Faaborg et al. 2010). See Tables 13 and 14 for a summary of impacts of climate change and conservation objectives.

A recent exercise used bioclimatic modelling to predict changes in bird species ranges based on anticipated climate change for different time periods and under different emissions scenarios (Lawler et al. unpublished; Lawler et al. 2009). Bioclimatic models use statistical associations between the current range of a species and a suite of climate variables to predict future ranges under new climate conditions. The study focused on priority bird species currently found within BCRs in Canada. The results suggest that bird species turnover in Canada will be highest in northern BCRs as species ranges continue to shift northward in the coming decades. In BCR 3 NL, the model predicts a gain of 69 species and a loss of 4 species for a total turnover (species gains + species losses) of 170%.

BCR 3 NL is currently experiencing some of the most rapid and severe climate changes on earth due to its location in higher latitudes, which are more susceptible to these climate alterations. In the Arctic region, it is anticipated that there will be an increase in precipitation, a substantial decrease in glaciers and in snow and ice cover, shorter and warmer winter seasons ,and thawing or destabilization of continuous permafrost terrain (e.g., tundra) due to an annual average temperature increase (Lund University 2011; Vasseur and Catto 2008).

In the Arctic, snow and ice cover for the months of May and June has already decreased by close to 20% and the winter season has shortened by almost two weeks (Arctic Climate Impact Assessment 2004). The melting of highly reflective snow and ice-covered surfaces reveals darker land and ocean surfaces, which means that less solar radiation is reflected back out into the atmosphere, which, in turn, furthers the warming of the planet (Arctic Climate Impact Assessment 2004). The length of the winter season and the amount of snow coverage will continue to decrease, and glaciers in the area are expected to lose between 10 and 30 % of their total mass (Lund University 2011). The increase in glacier melt and river runoff adds more freshwater to the ocean, raising global sea level and possibly slowing the ocean circulation that brings heat from the tropics to the poles, affecting global and regional climate (Arctic Climate Impact Assessment 2004). Severe coastal erosion will be a growing problem as rising sea level and a reduction in sea ice allows higher waves and storm surges to reach the shores (Vasseur and Catto 2008).

The Arctic tundra permafrost temperature has increased by half a degree to two degrees in the past few decades (Lund University 2011). A further thawing of the permafrost is expected to release carbon dioxide and other greenhouse gases which would raise temperatures by three to seven degrees (Arctic Climate Impact Assessment 2004; Lund University 2011). Permafrost degradation will impact natural ecosystems through the collapse of the ground surface, draining of lakes, wetland development, weakened coastlines and toppling of trees in susceptible areas (Arctic Climate Impact Assessment 2004).

The treeline in this region is also expected to move northward with forests replacing a significant fraction of existing tundra, and in turn tundra vegetation will retreat to higher elevations into polar deserts and will be stopped by a lack of suitable soils on exposed rocks and mountain peaks (Arctic Climate Impact Assessment 2004). This could bring new species into BCR 3 NL while severely limiting some species currently present. Impacts of climate change will also have implications for migratory species that depend on breeding and foraging grounds in BCR 3 NL (Arctic Climate Impact Assessment 2004).

In BCR 3 NL, 12 out of 17 priority bird species (71%) are affected by climate change. The threats are related to habitat loss, degradation or reductions in survival from changes in habitat structure (e.g., drying, thawing of tundra, altered hydraulic regimes), shifting of species ranges, changes in food webs and altered timing of seasonal cues (e.g., egg laying, migration). The birds may also be exposed to thermal stress from temperature extremes and habitat degradation due to severe weather such as sea-level rise and increasing severity and frequency of storms.

To maintain healthy bird populations in the face of a changing climate, conservation must be carefully planned and must be implemented so as to buffer birds from the negative impacts of climate change wherever possible (Faaborg et al. 2010).

Table 13. Examples of the current and anticipated effects of climate change on bird populations in Canada and some affected bird species.

Note: The species shown here do not represent an exhaustive list rather, they provide examples of species for which the effects of climate change have been suggested or documented.

Potential and Realized Effects of Climate Change	Examples of Species Affected in BCR 3 NL
Habitat loss as a result of ecosystem changes (e.g., advances in treeline)	Canada Goose (North Atlantic), Common Loon, Red-throated Loon
Increase in severe weather events	Northern Wheatear, Semipalmated Sandpiper
Range shifts to the north and from coastal to inland sites	American Golden-Plover, Least Sandpiper
Changes in ocean temperature and currents impact marine productivity and food webs	Peregrine Falcon (*anatum/tundrius*), Snowy Owl
Thawing of permafrost and increased evaporation will result in vegetation shifts and loss of wetlands in arctic habitat	American Golden-Plover, Long-tailed Duck, Canada Goose (North Atlantic)

Research and Population Monitoring Needs

Population Monitoring

An estimate of population trend for each species is necessary for the development of elements 1 and 3 (Species Assessment and Population Objectives). However, there are many species for which we are currently unable to estimate a population trend (PT) score. These species were typically assigned a population objective of "assess/maintain." The inability to estimate a PT score may be the result of a lack of monitoring data for the BCR as a whole or may be because certain species are not well captured by common monitoring techniques. To be able to effectively evaluate species believed to be of conservation concern, and to track those not yet of concern for future changes in status, we require more comprehensive monitoring that enables us to generate population trends for all species of birds in Canada. However, it is important to note that for some species, population trends are better understood at scales larger or smaller than the BCR unit, and lack of BCR-scale population trend data should not preclude acting to conserve these species.

A lack of information of population status was determined to be a significant conservation concern for 10 of the 17 priority bird species in BCR 3 NL. Table 15 provides a list of recommendations to improve knowledge gaps to allow for reliable estimates of population trends for these species and/or to investigate factors causing population declines.

A recent Environment Canada review (Avian Monitoring Review Steering Committee 2012) of avian monitoring programs in Canada made the following recommendations for each of the four main species groups:

Landbirds

- evaluate the ability of migration monitoring and checklist surveys to contribute to Environment Canada's monitoring needs; and
- evaluate the feasibility and cost-effectiveness of improving demographic monitoring to help understand causes of population change.

Shorebirds

- complete a first round of Arctic PRISM breeding shorebird surveys to obtain reliable population estimates and baseline distribution information across the Arctic;
- develop more reliable sampling methods for counting shorebirds in migration to address concerns about bias.

Waterbirds

- evaluate alternative strategies for filling gaps in coverage for both colonial waterbirds and marsh birds;
- consider both costs and potential reduction in risks; and
- carry out any necessary pilot work to evaluate options.

Waterfowl

- develop strategies to reduce expenditures on the prairie and eastern waterfowl breeding surveys, while retaining acceptable precision in population estimates;
- review the information needs and expenditures for duck banding programs.

Environment Canada intends to hold further discussions with other government officials and key bird and habitat conservation partners regarding bird population monitoring needs and priorities not only for BCR 3 NL but also for all priority birds found in the Atlantic region.

Table 15. Possible monitoring objectives for priority bird species for which there are currently insufficient data to reliably estimate population trend at the BCR 3 NL scales.

Objective	Priority Species Affected
Increase and improve monitoring through appropriate surveys in order to determine population trends for priority species	American Golden-Plover, Common Loon, Gray-cheeked Thrush, Least Sandpiper, Long-tailed Duck, Northern Wheatear, Red-throated Loon, Semipalmated Sandpiper, Short-eared Owl

Research

The focus of this section is to outline the main areas where a lack of information hindered the ability to understand conservation needs and make conservation recommendations. Research objectives presented here are bigger-picture questions, and not necessarily a schedule of studies, that are needed to determine the needs of individual species (Table 16). Undertaking research will allow us to improve future iterations of BCR strategies and to focus future implementation, and will also enable the development of new tools for conservation.

Table 16 provides a preliminary list of research needs for BCR 3 NL and will be used as a starting point for further discussions with other government officials and key bird and habitat conservation players as well as scientists about research needs and priorities not only for the BCR 3 NL but also for all priority birds within the Atlantic region.

Table 16. General research objectives in BCR 3 NL.

Objective	Priority Species Affected
Map land cover changes that have occurred between the baseline time periods established in BCR plans and current day in order to assess habitat transitions that may be due to climate change and how these transitions affect priority species.	American Golden-Plover, Least Sandpiper, Semipalmated Sandpiper
Map land cover changes that have occurred between the baseline time periods established in BCR plans and current day in order to correlate land use changes with species population changes.	Rough-legged Hawk

Threats Outside Canada

Many bird species found in Canada spend a large portion of their life cycle outside of the country (Fig. 22). These species face threats while they are outside Canada; in fact, threats to some migratory species may be most severe outside of the breeding season (Calvert et al. 2009). Of the 17 priority species in BCR 3 in Newfoundland, 2 (12%) are migratory and spend part of their annual cycle—up to half the year or more—outside Canada.

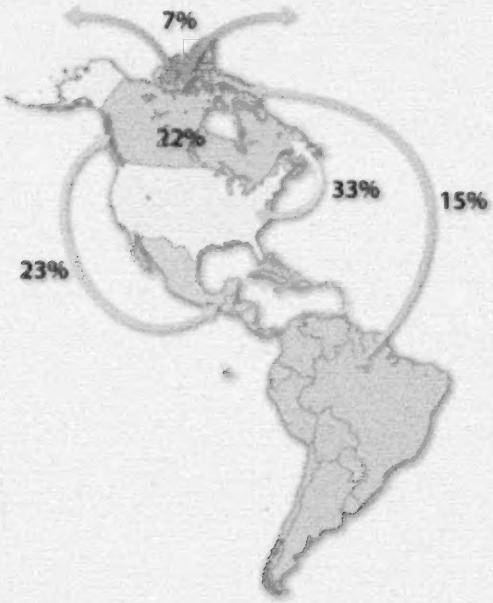


Figure 22. Percent of Canadian breeding birds that migrate to regions outside of Canada for part of their life cycle (North American Bird Conservation Initiative 2012).

Similar to our assessment of threats facing priority species within Canada, we conducted a literature review to identify threats facing priority species while they are outside Canada. A lack of data was a pervasive issue for this exercise. For many species, little is known about threats they face during migration or while on their wintering grounds. Indeed, for some species, their wintering ranges and habitat use are only poorly known, if at all. There is also little information linking specific wintering areas to particular breeding populations, making it difficult to connect declines in breeding populations to potential problems on the wintering grounds. In addition, what data exist on wintering migrant species are heavily biased towards work done in the United States, and little research is available from Mexico, Central and South America. While many of the threats identified in the United States likely affect species throughout their range, unique issues outside of the United States may have been missed. An absence of threats in a region may reflect that the necessary research has not yet been conducted (or may not be published in English). Because information on bird distributions during the non-breeding season is limited, we were unable to assess the scope and severity of threats to priority species while they are outside of Canada.

Despite this, some information is available to inform conservation work outside Canada (Fig. 23). Priority birds from BCR 3 NL face the loss or degradation of key migration, and wintering habitats. The primary sources of habitat loss and degradation include residential development (1.1 Housing and urban areas) and the conversion of grasslands and wetlands for agricultural use (2.1 Annual and perennial non-timber crops).

The threat of loss and degradation of stopover or overwinter habitat is greater for species that have relatively small and concentrated wintering ranges. Others, such as the Semipalmated Sandpiper, are particularly vulnerable as large numbers of the species concentrate at just a handful of key migratory stopover sites; degradation or loss of these sites could have devastating impacts on the species.

In addition to habitat loss, large sources of mortality for priority species from BCR 3 NL outside of Canada are related to legal and illegal hunting activities and poisoning from lead shot (5.1 Hunting and collecting terrestrial animals) and impacts from fishing and harvesting aquatic resources (5.4 Fishing and harvesting aquatic resources); these include incidental fisheries bycatch and disturbance from aquaculture operations. Other significant threats encountered by priority birds are the lethal and sub-lethal impacts of exposure to industrial and agricultural contaminants (9.2 Industrial and military effluents and 9.3 Agricultural and forestry effluents). Oil pollution, heavy metals, and pesticides cause mortality during migration and on the wintering grounds either directly by poisoning, or indirectly through reductions in prey.

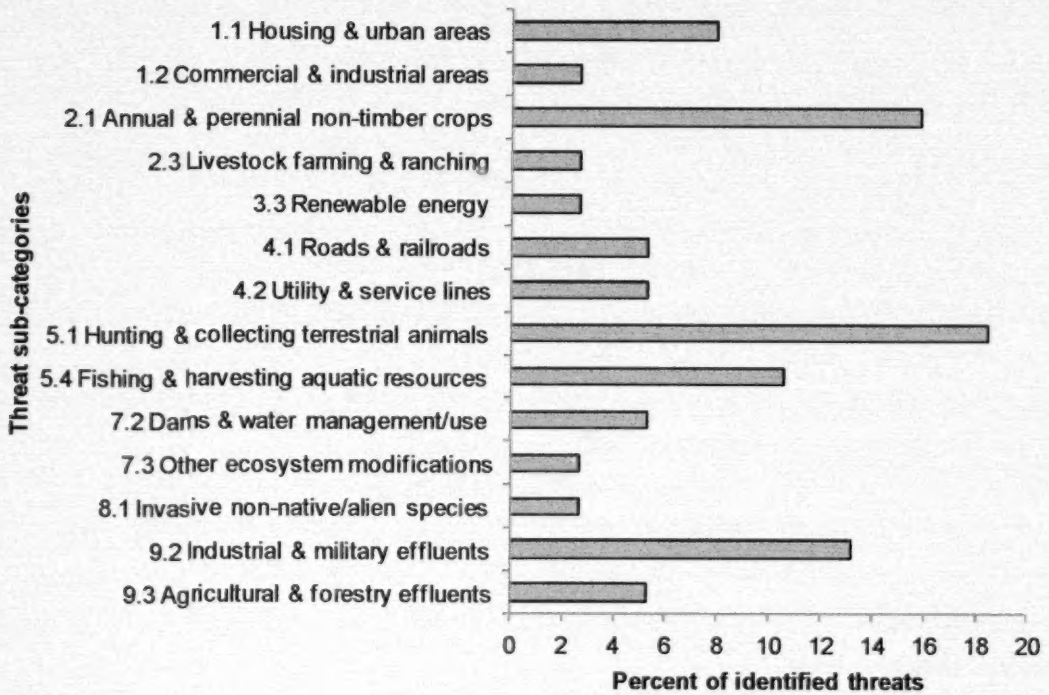


Figure 23. Percent of identified threats to priority species (by IUCN threat sub-category) in BCR 3 NL when they are outside Canada.

Note: Magnitudes could not be assigned for threats outside Canada due to lack of information on scope and severity.

Next Steps

The primary aims of BCR strategies are to present Environment Canada's priorities with respect to migratory bird conservation, and to provide a comprehensive overview of the conservation needs of bird populations to practitioners who may then undertake activities that promote bird conservation in Canada and internationally. Users from all levels of government, Aboriginal communities, the private sector, academia, NGOs and citizens will benefit from the information. BCR strategies can be used in many different ways depending on the needs of the user, who may focus on one or more of the elements of the strategy to guide their conservation projects.

BCR strategies will be updated periodically. Errors, omissions and additional sources of information may be provided to Environment Canada at any time for inclusion in subsequent versions.

References

Andres, B.A. *Analysis of Shorebird Population Trend Datasets*. 2009. Unpublished document for the North American Bird Conservation Initiative, U.S. Committee. State of the Birds. 36 pp., Washington, D.C.: U.S. Department of Interior.

Andres, B.A., P.A. Smith, C.L. Gratto-Trevor, and R.I.G. Morrison. 2012. *Population estimates of North American shorebirds*. Unpublished report.

Arctic Climate Impact Assessment. 2004. *Impacts of a Warming Arctic: Arctic Climate Impact Assessment*. Cambridge University Press.

Avian Monitoring Review Steering Committee. 2012. *Environment Canada Avian Monitoring Review – Final Report*. Environment Canada, Ottawa ON, xii + 170 pages + 3 appendices.

Calvert, A. M., S. J. Walde and P. D. Taylor. 2009. *Non-breeding drivers of population dynamics in seasonal migrants: conservation parallels across taxa*. Avian Conservation and Ecology - Écologie et conservation des oiseaux **4**(2): 5. www.ace-eco.org/vol4/iss2/art5/.

Calvert, A.M., C.A. Bishop, R.D. Elliot, E.A. Krebs, T.M. Kydd, C.S. Machtans, and G.J. Robertson. 2013. *A synthesis of human-related avian mortality in Canada*. Avian Conservation and Ecology-Écologie et conservation des oiseaux. In press.

Canadian Council on Ecological Areas. 2011. *Conservation Areas Reporting and Tracking System*. www.ccea.org/en_carts.html.

COSEWIC. 2012. *Committee on Status of Endangered Wildlife in Canada*. www.cosewic.gc.ca (accessed February 2013).

Donaldson, G.M., C. Hyslop, R.I.G. Morrison, H. L. Dickson, and I. Davidson. 2000. *Canadian Shorebird Conservation Plan*. www.cws-scf.ec.gc.ca/publications/AbstractTemplate.cfm?lang=eandid=318. Ottawa, ON.: Canadian Wildlife Service, Environment Canada.

Eastern Habitat Joint Venture [EHJV]. 2010. *Eastern Habitat Joint Venture Implementation Plan 2007-2012*. 28pp.

Eeva, T. and Lehikoinen, E. 2000. *Recovery of breeding success in wild birds*. Nature **403**: 851-852.

Encyclopedia Britannica Online. 2013. *Newfoundland and Labrador*. www.britannica.com/EBchecked/topic/412929/Newfoundland-and-Labrador (accessed March 2013).

Environment Canada. 2013. *Bird Conservation Strategy for Bird Conservation Region 7 and Marine Biogeographic Unit 10 in Newfoundland and Labrador: Taiga Shield and Hudson Plains, and Newfoundland-Labrador Shelves*. Canadian Wildlife Service, Sackville, NB. In press.

Environment Canada. 2011. *Bird Conservation Regions of Canada*. www.bsc-eoc.org/international/bcrcanada.html (accessed February 2013).

Environment Canada. 2003. Great Lakes Fact Sheet. *Fish and wildlife health effects in the Canadian Great Lakes areas of concern*. 2003. ISBN 0-662-34076-0. www.ec.gc.ca/Publications/A793CA48-2A8C-4F38-8B1C-B3AEBEAE2342%5CFishAndWildlifeHealthEffectsInTheCanadianGreatLakesareasofconcern.pdf.

Faaborg, J., R. T. Holmes, A. D. Anders, K. L. Bildstein, K. M. Dugger, S. A. Gauthreaux, P. Heglund, K. A. Hobson, A. E. Jahn, D. H. Johnson, S. C. Latta, D. J. Levey, P. P. Marra, C. L. Merkord, E. Nol, S. I. Rothstein, T. W. Sherry, T. S. Sillett, F. R. Thompson, and N. Warnock. 2010. *Conserving migratory land birds in the New World: Do we know enough?* Ecological Applications **20**(2): 398-418.

Food and Agriculture Organization (FAO). 2000. *Land cover classification system*. United Nations Food and Agriculture Organization, Rome. www.fao.org/docrep/003/x0596e/x0596e00.htm.

Franceschini, M.D., C.M. Custer, T.W. Custer, J.M. Reed, and L.M. Romero. 2008. *Corticosterone stress response in tree swallows nesting near polychlorinated biphenyl- and dioxin-contaminated rivers.* Environmental Toxicology and Chemistry **27**: 2326–2331.

Kennedy, J.A., E.A. Krebs and A.F. Camfield. 2012. *A Manual for Completing All-bird Conservation Plans in Canada, April 2012 version*. Canadian Wildlife Service, Environment Canada. Ottawa, ON.

Lawler, J. J., S. L. Shafer, D. White, P. Kareiva, E. P. Maurer, A. R. Blaustein, and P. J. Bartlein. 2009. *Projected climate-induced faunal change in the western hemisphere.* Ecology **90**: 588-597.

Lawler, J. L., J.-F. Gobeil, A. Baril, K. Lindsay, A. Fenech and N. Comer. 2010. *Potential Range Shifts of Bird Species in Canadian Bird Conservation Regions Under Climate Change*. Canadian Wildlife Service, Environment Canada. Unpublished technical report.

Lund University. 2011. *Effects of Climate Change in Arctic More Extensive Than Expected, Report Finds.* ScienceDaily, 4 May. www.sciencedaily.com/releases/2011/05/110504084032.htm (accessed March 2013).

Milko, R., L. Dickson, R. Elliot, and G. Donaldson. 2003. *Wings Over Water: Canada's Waterbird Conservation Plan*. Canadian Wildlife Service, Environment Canada, Ottawa, ON. 28pp. www.cws-scf.ec.gc.ca/publications/wow/Wings-EN-2003.pdf.

Mineau, P. 2010. *Avian mortality from pesticides used in agriculture in Canada*. Wildlife and Landscape Science Directorate. Environment Canada Science and Technology Branch. Unpublished report.

Newfoundland and Labrador Department of Environment and Conservation. 2013. *Birds.* www.env.gov.nl.ca/env/wildlife/endangeredspecies/birds.html (accessed February 2013).

National Audubon Society. 2009. *Birds and climate change - ecological disruption in motion*. 16 pp. http://birds.audubon.org/sites/default/files/documents/birds_and_climate_report.pdf

Newfoundland and Labrador Statistics Agency. 2013. *Population and Demographic: Population - Census Division and St. John's CMA, 1996-2012*. www.stats.gov.nl.ca/Statistics/Population (accessed February 2013).

North American Bird Conservation Initiative (NABCI), U.S. Committee. 2009. *The State of the Birds, United States of America, 2009*. U.S. Department of Interior: Washington, DC. 36 pp.

North American Bird Conservation Initiative (NABCI), U.S. Committee. 2010. *The State of the Birds 2010 Report on Climate Change, United States of America*. U.S. Department of the Interior: Washington, DC.

North American Bird Conservation Initiative (NABCI). 2012. *The State of Canada's Birds, 2012*. Environment Canada, Ottawa, Canada. 36 pp.

North American Bird Conservation Initiative (NABCI). 2013. *Bird Conservation Region 3 – Arctic Plains and Mountains*. www.nabci.net/International/English/bcr3.html (accessed February 2013).

North American Waterfowl Management Plan, Plan Committee. 2004. *North American Waterfowl Management Plan 2004. Implementation Framework: Strengthening the Biological Foundation*. Canadian Wildlife Service, U.S. Fish and Wildlife Service, Secretaria de Medio Ambiente y Recursos Naturales, 106pp. www.nawmp.ca/pdf/impfr-en-k.pdf.

Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Iñigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, T.C. Will. 2004. *Partners in Flight North American Landbird Conservation Plan*. Cornell Lab of Ornithology. Ithaca, NY.

Salafsky, N., D. Salzer, A. J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S. H. M. Butchart, B. Collen, N. Cox, L. L. Master, S. O'Connor, and D. Wilkie. 2008. *A standard lexicon for biodiversity conservation: Unified classifications of threats and actions*. Conservation Biology **22**(4):897-911.

Table 14. Proposed conservation objectives and actions to address climate change.

Threats Addressed	Threat Sub-category	Objective	Objective Category	Recommended Actions	Action Category	Priority Bird Species Affected (Rank of Threat)
Climate change impacts habitat and negatively affects survival and productivity of birds	11.1 Habitat shifting and alteration	Reduce greenhouse gas emissions	6.1 Support efforts to reduce greenhouse gas emissions	Support efforts to reduce greenhouse gas emissions.	5.2 Policies and regulations	American Golden-Plover (H) Canada Goose (North Atlantic) (M) Common Loon (M) Gyrfalcon (L) Least Sandpiper (H) Long-tailed Duck (H) Northern Wheatear (M) Peregrine Falcon (*anatum/tundrius*) (M) Red-throated Loon (M) Semipalmated Sandpiper (H) Snow Bunting (L) Snowy Owl (H)
		Mitigate the effects of climate change on bird habitat	6.2 Manage for habitat resilience as climate changes	Manage for habitat resilience to allow ecosystems to adapt despite disturbances and changing conditions. Minimize anthropogenic stressors (such as development or pollution) to help maintain resilience.	1.1 Site/area protection	
				Manage buffer areas and the matrix between protected areas to enhance movement of species across the landscape.	2.1 Site/area management	
				Manage ecosystems to maximize carbon storage and sequestration while simultaneously enhancing bird habitat.		
				Incorporate predicted shifts in habitat into landscape level plans (e.g., when establishing protected areas ensure the maintenance of north-south corridors to facilitate northward range shifts of bird species).	5.2 Policies and regulations	
Population-level effects of climate change are unknown	12.1 Information lacking	Improve understanding of climate change on	7.5 Improve understanding of potential effects of climate change	Evaluate which species are most vulnerable to climate change.	8.1 Research	American Golden-Plover (H) Least Sandpiper (H) Semipalmated Sandpiper
				Investigate the cumulative effects of		

Table 14 continued

Threats Addressed	Threat Sub-category	Objective	Objective Category	Recommended Actions	Action Category	Priority Bird Species Affected (Rank of Threat)
		birds and their habitats		climate change. Investigate behavioural responses to climate change (such as range shifts, changes in demographic rates, and changes in timing of breeding and migration) through long-term studies. Continue to monitor bird populations so changes in numbers and distributions can be identified. Undertake monitoring to evaluate the effectiveness of mitigation activities.	8.2 Monitoring	(H)

Scheuhammer, A.M., S. L. Money, D. A. Kirk, and G. Donaldson. 2003. *Lead fishing sinkers and jigs in Canada: Review of their use patterns and toxic impacts on wildlife*. Occasional Paper no. 108. Canadian Wildlife Service, Environment Canada.

Scheuhammer, A. M., and S. L. Norris. 1996. *The ecotoxicology of lead shot and lead fishing weights.* Ecotoxicology **5**:279-295.

Species at Risk Public Registry. 2012. *Schedule 1: List of Wildlife Species at Risk*. www.sararegistry.gc.ca/species/schedules_e.cfm?id=1 (accessed February 2013).

Vasseur, L. and N. Catto. 2008. "Atlantic Canada." In *From Impacts to Adaptation: Canada in a Changing Climate 2007*, edited by Lemmen, F.J. Warren, J. Lacroix and E. Bush D.S. Government of Canada, Ottawa, ON. p. 119-170.

Appendix 2

General Methodology for Compiling the Six Standard Elements

Each strategy includes six required elements to conform to the national standard. An extensive manual (Kennedy et al. 2012) provides methods and other guidance for completing each element. The six elements provide an objective means of moving towards multi-species conservation efforts that are targeted to species and issues of highest priority. The six elements are:

1) identifying priority species – to focus conservation attention on species of conservation concern and those most representative of the region
2) attributing priority species to habitat classes – a tool for identifying habitats of conservation interest and a means of organizing and presenting information
3) setting population objectives for priority species – an assessment of current population status compared to the desired status, and a means of measuring conservation success
4) assessing and ranking threats – identifies the relative importance of issues affecting populations of priority species within the planning area as well as outside Canada (i.e., throughout their life cycle)
5) setting conservation objectives – outlines the overall conservation goals in response to identified threats and information needs; also a means of measuring accomplishments
6) proposing recommended actions – strategies to begin on-the-ground conservation to help achieve conservation objectives.

The first four elements apply to individual priority species, and together comprise an assessment of the status of priority species and the threats they face. The last two elements integrate information across species to create a vision for conservation implementation both within Canada and in countries that host priority species during migration and the non-breeding season.

Element 1: Priority Species Assessment

The Bird Conservation Strategies identify "priority species" from all regularly occurring bird species in each subregion. The priority species approach allows management attention and limited resources to focus on those species with particular conservation importance, ecological significance and/or management need. The species assessment processes used are derived from standard assessment protocols developed by the four major bird conservation initiatives[1].

The species assessment process applies quantitative rule sets to biological data for factors such as:

- population size,
- breeding and non-breeding distribution,

[1] Partners in Flight (landbirds), Wings Over Water (waterbirds), Canadian Shorebird Conservation Plan (shorebirds), North American Waterfowl Management Plan (waterfowl).

- population trend,
- breeding and non-breeding threats, and
- regional density and abundance

The assessment is applied to individual bird species and ranks each species in terms of its biological vulnerability and population status. The assessments can be used to assign subregional (i.e., provincial section of a BCR), regional (BCR) and continental conservation priorities among birds.

Element 2: Habitats Important to Priority Species

Identifying the broad habitat requirements for each priority species in the breeding and non-breeding season allows species with shared habitat-based conservation issues or actions to be grouped. If many priority species associated with the same habitat class face similar conservation issues, then conservation action in that habitat class may support populations of several priority species. In most cases, all habitat associations identified in the literature are listed for individual species. Habitat associations do not indicate relative use, suitability ratings or rankings, nor selection or avoidance; this could be a useful exercise to undertake in the future.

In order to link with other national and international land classification schemes and to capture the range of habitat types across Canada, habitat classes for all priority species are based, at the coarsest level, on the hierarchical approach of the international Land Cover Classification System (LCCS) developed by the United Nations Food and Agriculture Organization (FAO 2000). Some modifications were made to the LCCS scheme to reflect habitat types that are important to birds that are not included in the classification (e.g., marine habitats). Species often are assigned to more than one of these coarse habitat classes. To retain the link to regional spatial data (e.g. provincial forest inventories, etc.), or to group species into regionally relevant habitat classes, individual BCR strategies may identify finer scale habitat classes. Finer-scale habitat attributes and the surrounding landscape context were also captured when possible to better guide the development of specific conservation objectives and actions.

Element 3: Population Objectives

A central component of effective conservation planning is setting clear objectives that can be measured and evaluated. Bird Conservation Strategies set objectives based upon the conservation philosophies of national and continental bird initiatives, including the North American Bird Conservation Initiative (NABCI), that support conserving the distribution, diversity and abundance of birds throughout their historical ranges. The baselines for population objectives used in this planning exercise (those existing during the late 1960s, 1970s and 1990s for eastern waterfowl) reflect population levels prior to widespread declines. Most of the four bird conservation initiatives under the umbrella of NABCI have adopted the same baselines at the continental and national scale (waterfowl, shorebirds and landbirds; national and continental waterbird plans have not yet set population objectives). Some regions in the current planning effort have adjusted baselines to reflect the start of systematic monitoring. The ultimate measure of conservation success will be the extent to which population objectives

have been reached. Progress towards population objectives will be regularly assessed as part of an adaptive management approach.

Population objectives for all bird groups are based on a quantitative or qualitative assessment of species' population trends. If the population trend for a species is unknown, the objective is usually "assess and maintain", and a monitoring objective is set. Harvested waterfowl and stewardship species that are already at desired population levels are given an objective of "maintain". For any species listed under SARA or under provincial/territorial endangered species legislation, Bird Conservation Strategies defer to population objectives in available Recovery Strategies and Management Plans. If recovery documents are not available, objectives are set using the same approach as for other species within that bird group. Once recovery objectives are available, they will replace interim objectives.

Element 4: Threat Assessment

Bird population trends are driven by factors that affect reproduction and/or survival during any point in the annual cycle. Threats that can reduce survival include, for example, reduced food availability at migratory stopovers or exposure to toxic compounds. Examples of threats that can reduce reproductive success may include high levels of nest predation or reduced quality or quantity of breeding habitat.

The threats assessment exercise included three main steps:

1. Conducting a literature review to itemize past, current and future threats for each priority species and classifying the threats using a standardized classification scheme (Salafsky et al. 2008).
2. Ranking the magnitude of threats for priority species following a standardized protocol (Kennedy et al. 2012).
3. Preparing a set of threat profiles for the BCR subregion, for broad habitat categories.

Each threat was categorized following the IUCN-CMP threat classification scheme (Salafsky et al. 2008) with the addition of categories to capture species for which we lack information. Only threats stemming from human activity were included in the threats assessment because they can be mitigated; natural processes that prevent populations from expanding beyond a given level were considered and noted, but no actions beyond research and/or monitoring were developed. Threats were ranked by assessing the scope (the proportion of the species' range within the subregion that is affected by the threat) and severity (the relative impact that the threat poses to the viability of the species' populations) of the threat. The scores for scope and severity were combined to determine an overall magnitude low, medium, high or very high. These magnitudes were then rolled up by threat categories and sub-categories across habitat types (see Kennedy et al. 2012 for details on this process). The threats roll-up allows for comparison of the relative magnitude of the threats among threat categories and habitat types. The scoring and ranking of threats not only helps to determine which threats contribute most to population declines in individual species, but also allows us to focus attention on the threats with the greatest effects on suites of species or in broad habitat classes.

In BCR 3 NL, a category was added to the threat classification scheme to address species with inadequate monitoring or research information (category 12 "Other direct threats" and sub-category 12.1 "Information lacking").

Element 5: Conservation Objectives

Overall, conservation objectives represent the desired conditions, within the subregion that will collectively contribute to achieving population objectives. Objectives may also outline the research or monitoring needed to improve the understanding of species declines and how to best take action.

Currently, most conservation objectives are measurable using qualitative categories (e.g., decrease, maintain, increase) that will allow an evaluation of implementation progress, but they are not linked quantitatively to population objectives. Implementation that incorporates an active adaptive management process is an underlying principle of this conservation effort and will allow for future evaluation of whether or not reaching conservation objectives contributed to achieving population objectives.

Whenever possible, conservation objectives benefit multiple species, and/or respond to more than one threat. However, where necessary, they focus on the specific requirements of a single species.

Conservation objectives generally fall into one of two broad categories:

- habitat objectives within the BCR subregion (the quantity, quality and configuration of priority habitats),
- non-habitat objectives within the BCR subregion (minimizing mortality by reducing predation, conducting education and outreach to reduce human disturbance, etc.)

Ideally, habitat objectives would reflect the type, amount and location of habitat necessary to support population levels of priority species outlined in the population objectives. Currently, there is a lack of data and tools at the BCR scale to develop these specific quantitative objectives. Threats-based objectives present the direction of change required to move toward the population objectives using the best available information and knowledge of ecosystem management strategies within broad habitat types

Element 6: Recommended Actions

Recommended conservation actions are the strategies required to achieve conservation objectives. Recommended actions are usually made at the strategic level rather than being highly detailed and prescriptive. Actions were classified following the IUCN-CMP classification of conservation actions (Salafsky et al. 2008; see Appendix 3: IUCN Conservation Actions Categories) with the addition of categories to address research and monitoring needs. When possible, more detailed recommendations can be included, for example if beneficial management practices, ecosystem plans or multiple recovery documents are available for a

subregion. However, actions should be detailed enough to provide initial guidance for implementation.

The objectives for research, monitoring and widespread issues may not have actions associated with them. These issues are often so multi-faceted that actions are best designed in consultation with partners and subject-matter experts. Implementation teams will be better positioned to address these complex issues, drawing input from various stakeholders.

Recommended actions defer to or support those provided in recovery documents for species at risk at the federal, provincial or territorial level, but because these strategies are directed at multiple species, actions are usually more general than those developed for individual species. For more detailed recommendations for species at risk, readers should consult recovery documents.

Appendix 3

Tables adapted from Salafsky et al. (2008).

IUCN Threat Categories

Table A-4: International Union for Conservation of Nature – Conservation Measures Partnership (IUCN-CMP) classification of threats to biodiversity as per Salafsky et al. (2008). Note that not all threat categories apply to birds or occur in every BCR or MBU.

Threat Category/Sub-category	Definition
1 Residential and commercial development	Human settlements of other nonagricultural land uses with a substantial footprint
1.1 Housing and urban areas	Human cities, towns and settlements including nonhousing development typically integrated with housing
1.2 Commercial and industrial areas	Factories and other commercial centers
1.3 Tourism and recreation areas	Tourism and recreation sites with a substantial footprint
2 Agriculture and aquaculture	Threats from farming and ranching as a result of agricultural expansion and intensification, including siviculture, mariculture and aquaculture
2.1 Annual and perennial non-timber crops	Crops planted for food, fodder, fiber, fuel or other uses
2.2 wood and pulp plantations	Stands of timber planted for timber or fiber outside of natural forests, often with non-native species
2.3 Livestock farming and ranching	Domestic terrestrial animals raised in one location on farmed of nonlocal resources (farming); also domestic or semidomesticated animals allowed to roam in the wild and supported by natural habitats (ranching)
2.4 Marine and freshwater aquaculture	Aquatic animals raised in one location on farmed or nonlocal resources; also hatchery fish allowed to roam in the wild
3 Energy production and mining	Threats from production of nonbiological resources
3.1 Oil and gas drilling	Exploring for, developing, and producing petroleum and other liquid hydrocarbons
3.2 Mining and quarrying	Exploring for, developing, and producing minerals and rocks
3.3 Renewable energy	Exploring, developing and producing renewable energy
4 Transportation and service corridors	Threats from long, narrow transport corridors and the vehicles that use them including associated wildlife mortality
4.1 Roads and railroads	Surface transport on roadways and dedicated tracks
4.2 Utility and service lines	Transport of energy and resources
4.3 Shipping lanes	Transport on and in freshwater and ocean waterways
4.4 Flight paths	Air and space transport
5 Biological resource use	Threats from consumptive use of "wild" biological resources including deliberate and unintentional harvesting effects; also persecution or control of specific species
5.1 Hunting and collecting terrestrial animals	Killing or trapping terrestrial wild animals or animal products for commercial, recreation, subsidence, research or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch
5.2 Gathering terrestrial plants	Harvesting plants, fungi, and other nontimber/nonanimal products for commercial, recreation, subsidence, research or

Table A-4 continued

Threat Category/Sub-category	Definition
	cultural purposes, or for control purposes
5.3 Logging and wood harvesting	Harvesting trees and other woody vegetation for timber, fiber, or fuel
5.4 Fishing and harvesting aquatic resources	Harvesting aquatic wild animals or plants for commercial, recreation, subsidence, research or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch
6 Human intrusions and disturbance	Threats from human activities that alter, destroy and disturb habitats and species associated with nonconsumptive uses of biological resources
6.1 Recreational activities	People spending time in nature or travelling in vehicles outside established transport corridors, usually for recreation purposes
6.2 War, civil unrest and military exercises	Actions by formal or paramilitary forces without a permanent footprint
6.3 Work and other activities	People spending time in or travelling in natural environments for reasons other than recreation or military activities
7 Natural system modifications	Threats from actions that convert or degrade habitat in service of "managing" natural or seminatural systems, often to improve human welfare
7.1 Fire and fire suppression	Suppression or increase in fire frequency and/or intensity outside of its natural range of variation
7.2 Dams and water management/use	Changing water flow patterns from their natural range of variation either deliberately or as a result of other activities
7.3 Other ecosystem modifications	Other actions that convert or degrade habitat in the service of "managing" natural systems to improve human welfare.
8 Invasive and other problematic species and genes	Threats from non-native and native plants, animals, pathogens/microbes, or genetic material that have or are predicted to have harmful effects on biodiversity following their introduction, spread, and/or increase in abundance
8.1 Invasive non-native/alien species	Harmful plants, animals, pathogens and other microbes not originally found within the ecosystem(s) in question and directly or indirectly introduced and spread into it by human activities
8.2 Problematic native species	Harmful plants, animals, pathogens and other microbes that are originally found within the ecosystem(s) in question, but have become "out of balance" or "released" directly or indirectly due to human activities
8.3 Introduced genetic material	Human-altered or transported organisms or genes
9 Pollution	Threats from introduction of exotic and/or excess materials or energy from point and nonpoint sources
9.1 Household sewage and urban waste water	Water-borne sewage and nonpoint runoff from housing and urban areas that include nutrients, toxic chemicals and/or sediments
9.2 Industrial and military effluents	Water-borne pollutants from industrial and military sources including mining, energy production, and other resource extraction industries that include nutrients, toxic chemicals and/or sediments
9.3 Agricultural and forestry effluents	Water-borne pollutants from agricultural, sivicultural, and

Appendix 1

List of All Bird Species in BCR 3 NL

Table A-1. Complete list of species in BCR 3 NL, when they are in the BCR (breeding, migrant, winter, seasonal) and their priority status.

Latin Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Anthus rubescens	American Pipit	Pipit d'Amérique	Landbirds	Y				
Turdus migratorius	American Robin	Merle d'Amérique	Landbirds	Y				
Spizella arborea	American Tree Sparrow	Bruant hudsonien	Landbirds	Y				
Setophaga striata	Blackpoll Warbler	Paruline rayée	Landbirds	Y				
Corvus corax	Common Raven	Grand corbeau	Landbirds	Y		Y		
Acanthis flammea	Common Redpoll	Sizerin flammé	Landbirds	Y				
Aquila chrysaetos	Golden Eagle	Aigle royal	Landbirds	Y				Y
Perisoreus canadensis	Gray Jay	Mésangeai du Canada	Landbirds	Y		Y		
Catharus minimus	Gray-cheeked Thrush	Grive à joues grises	Landbirds	Y				Y
Falco rusticolus	Gyrfalcon	Faucon gerfaut	Landbirds	Y				Y
Acanthis hornemanni	Hoary Redpoll	Sizerin blanchâtre	Landbirds		Y			
Eremophila alpestris	Horned Lark	Alouette hausse-col	Landbirds	Y				
Calcarius lapponicus	Lapland Longspur	Plectrophane lapon	Landbirds	Y				
Lanius excubitor	Northern Shrike	Pie-grièche grise	Landbirds	Y				
Oenanthe oenanthe	Northern Wheatear	Traquet motteux	Landbirds	Y				Y
Falco peregrinus	Peregrine Falcon (*anatum/tundrius*)	Faucon pèlerin (*anatum/tundrius*)	Landbirds	Y				Y
Pinicola enucleator	Pine Grosbeak	Durbec des sapins	Landbirds	Y				
Lagopus muta	Rock Ptarmigan	Lagopède alpin	Landbirds	Y	Y	Y		
Buteo lagopus	Rough-legged Hawk	Buse pattue	Landbirds	Y				Y
Regulus calendula	Ruby-crowned Kinglet	Roitelet à couronne rubis	Landbirds	Y				

Table A-1 continued

Latin Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Passerculus sandwichensis	Savannah Sparrow	Bruant des prés	Landbirds	Y				
Asio flammeus	Short-eared Owl	Hibou des marais	Landbirds	Y				Y
Plectrophenax nivalis	Snow Bunting	Plectrophane des neiges	Landbirds	Y				Y
Bubo scandiacus	Snowy Owl	Harfang des neiges	Landbirds	Y		Y		Y
Falcipennis canadensis	Spruce Grouse	Tétras du Canada	Landbirds	Y		Y		
Zonotrichia leucophrys	White-crowned Sparrow	Bruant à couronne blanche	Landbirds	Y				
Lagopus lagopus	Willow Ptarmigan	Lagopède des saules	Landbirds	Y		Y		
Cardellina pusilla	Wilson's Warbler	Paruline à calotte noire	Landbirds	Y				
Pluvialis dominica	American Golden-Plover	Pluvier bronzé	Shorebirds		Y			Y
Pluvialis squatarola	Black-bellied Plover	Pluvier argenté	Shorebirds		Y			
Calidris alpina	Dunlin	Bécasseau variable	Shorebirds		Y			
Calidris minutilla	Least Sandpiper	Bécasseau minuscule	Shorebirds	Y				Y
Calidris melanotos	Pectoral Sandpiper	Bécasseau à poitrine cendrée	Shorebirds		Y			
Calidris maritima	Purple Sandpiper	Bécasseau violet	Shorebirds		Y			
Phalaropus lobatus	Red-necked Phalarope	Phalarope à bec étroit	Shorebirds	Y				
Charadrius semipalmatus	Semipalmated Plover	Pluvier semipalmé	Shorebirds	Y				
Calidris pusilla	Semipalmated Sandpiper	Bécasseau semipalmé	Shorebirds	Y				Y
Calidris fuscicollis	White-rumped Sandpiper	Bécasseau à croupion blanc	Shorebirds		Y			
Chroicocephalus philadelphia	Bonaparte's Gull	Mouette de Bonaparte	Waterbirds		Y	Y		
Gavia immer	Common Loon	Plongeon huard	Waterbirds	Y				Y
Larus hyperboreus	Glaucous Gull	Goéland bourgmestre	Waterbirds		Y	Y		
Larus marinus	Great Black-backed Gull	Goéland marin	Waterbirds	Y	Y	Y		
Larus argentatus	Herring Gull	Goéland argenté	Waterbirds	Y	Y	Y		

Table A-1 continued

Latin Name	English Name	French Name	Bird Group	Breeding	Migrant	Wintering	Seasonal	Priority
Larus glaucoides	Iceland Gull	Goéland arctique	Waterbirds		Y	Y		
Larus fuscus	Lesser Black-backed Gull	Goéland brun	Waterbirds		Y	Y		
Stercorarius parasiticus	Parasitic Jaeger	Labbe parasite	Waterbirds	Y				
Gavia stellata	Red-throated Loon	Plongeon catmarin	Waterbirds	Y				Y
Larus delawarensis	Ring-billed Gull	Goéland à bec cerclé	Waterbirds	Y	Y	Y		
Anas rubripes	American Black Duck	Canard noir	Waterfowl		Y			
Bucephala islandica	Barrow's Goldeneye (Eastern)[1]	Garrot d'Islande (de l'Est)	Waterfowl					
Branta canadensis	Canada Goose	Bernache du Canada	Waterfowl	Y				
Branta canadensis	Canada Goose (North Atlantic)	Bernache du Canada (Atlantique Nord)	Waterfowl	Y				Y
Aythya marila	Greater Scaup	Fuligule milouinan	Waterfowl	Y	Y			
Histrionicus histrionicus	Harlequin Duck (Eastern)	Arlequin plongeur (de l'Est)	Waterfowl	Y				Y
Clangula hyemalis	Long-tailed Duck	Harelde kakawi	Waterfowl	Y	Y			Y
Anas acuta	Northern Pintail	Canard pilet	Waterfowl		Y			
Mergus serrator	Red-breasted Merganser	Harle huppé	Waterfowl	Y				

[1] Evidence was lacking in 2009 on whether this species was present within BCR 3; however, in 2012, new information suggests a possible presence in inland waterbodies.

List of Priority Bird Species Associated with Each Habitat Class in BCR 3 NL

Table A-2: List of priority bird species associated with each habitat class in BCR 3 NL. For priority species below high tide line and in marine waters, please consult MBU 10 NL in the BCR 7 NL strategy (Environment Canada 2013).

Priority Species	Bird Group	Shrub/early successional	Lichens/mosses	Bare areas	Wetlands	Riparian	Waterbodies, snow and ice	Coastal (above high tide)
Total number of priority species in each habitat class		**11**	**4**	**4**	**7**	**7**	**5**	**10**
Golden Eagle	Landbirds	Y		Y		Y		
Gray-cheeked Thrush	Landbirds	Y						
Gyrfalcon	Landbirds	Y		Y		Y		Y
Northern Wheatear	Landbirds	Y	Y	Y				
Peregrine Falcon (*anatum/tundrius*)	Landbirds	Y	Y			Y		Y
Rough-legged Hawk	Landbirds	Y				Y		
Short-eared Owl	Landbirds	Y			Y			Y
Snow Bunting	Landbirds		Y	Y				Y
Snowy Owl	Landbirds	Y			Y	Y		
American Golden-Plover	Shorebirds	Y						Y
Least Sandpiper	Shorebirds		Y		Y	Y		Y
Semipalmated Sandpiper	Shorebirds	Y			Y	Y		Y
Common Loon	Waterbirds						Y	Y
Red-throated Loon	Waterbirds				Y		Y	
Canada Goose (North Atlantic)	Waterfowl	Y			Y		Y	Y
Harlequin Duck (Eastern)	Waterfowl						Y	Y
Long-tailed Duck	Waterfowl				Y		Y	

List of All Regional Threats in BCR 3 NL

Table A-3: List of all the regional threats (with rolled-up rankings at the sub-threat level) sorted by threat sub-category (sub-categories are numbered as per Salafsky et al. 2008) summarized across habitat classes in BCR 3 NL. "Y" means that the threat was associated within the particular habitat class. The rolled-up score for each sub-threat for each habitat is also provided. L: Low, M: Medium, H: High, V: Very High.

Regional Threats	Shrub/early successional	Lichens/mosses	Bare areas	Wetlands	Riparian	Waterbodies, snow and ice	Coastal (above high tide)
4.4 Flight paths	L			L	L		
Mortality due to collisions with aircrafts	Y			Y	Y		
5.1 Hunting and collecting terrestrial animals	L	L	L	L	L	L	L
Legal hunting	Y			Y		Y	Y
Poaching (e.g., eggs, nestlings) and incidental take by hunters or trappers	Y	Y	Y	Y	Y	Y	Y
6.1 Recreational activities	L		L		L		L
Reduction in fecundity due to human disturbance from recreation (e.g., climbers, campers)	Y		Y		Y		
Habitat degradation from disturbance due to human recreation and/or development at moulting sites.							Y
8.2 Problematic native species	L			L		L	L
Reduction in fecundity due to competition with other grazing geese for nesting sites	Y			Y		Y	Y
9.2 Industrial and military effluents				L	L	L	L
Reduction in survival from heavy metal (e.g., mercury, PCBs) contamination				Y	Y	Y	Y
11.1 Habitat shifting and alteration	H	M	L	H	H	M	H

Table A-3 continued

Regional Threats	Shrub/early successional	Lichens/mosses	Bare areas	Wetlands	Riparian	Waterbodies, snow and ice	Coastal (above high tide)
Habitat loss or degradation from changes in habitat structure (e.g., drying, thawing of tundra) due to climate change	Y	Y	Y	Y	Y	Y	Y
Reduction in survival from changes in food webs due to climate change	Y	Y		Y	Y		Y
Habitat degradation from the alteration of seasonal cues (e.g., migration, egg laying) due to climate change	Y	Y	Y	Y	Y		Y
11.3 Temperature extremes	**M**	**L**	**M**		**L**		**L**
Habitat degradation due to temperature extremes	Y	Y	Y				
Reduction in survival due to thermal stress	Y		Y		Y		Y
11.4 Storms and flooding	**L**	**L**	**L**				**M**
Habitat degradation due to severe weather	Y	Y	Y				Y
12.1 Information lacking	**VH**	**H**	**M**	**H**	**H**	**M**	**VH**
General lack of information	Y	Y	Y	Y			Y
Lack of reliable population trend information	Y	Y		Y	Y	Y	Y
Lack of knowledge on the effects of changes in land use	Y				Y		
Lack of knowledge on the impacts of climate change on habitats	Y	Y		Y	Y		Y

Table A-4 continued

Threat Category/Sub-category	Definition
	aquaculture systems that include nutrients, toxic chemicals and/or sediments including the effects of these pollutants on the site where they are applied
9.4 Garbage and solid waste	Rubbish and other solid materials including those that entangle wildlife
9.5 Air-borne pollutants	Atmospheric pollutants from point and non-point sources
9.6 Excess energy	Inputs of heat, sound or light that disturb wildlife or ecosystems
10 Geological events	Threats from catastrophic geological events
10.1 Volcanoes	Volcanic events
10.2 Earthquakes/tsunamis	Earthquakes and associated events
10.3 Avalanches/landslides	Avalanches or landslides
11 Climate change and severe weather	Long-term climatic changes that may be linked to global warming and other severe climatic or weather events outside of the natural range of variation that could wipe out a vulnerable species or habitat
11.1 Habitat shifting and alteration	Major changes in habitat composition and location
11.2 Droughts	Periods in which rainfall falls below the normal range of variation
11.3 Temperature extremes	Periods in which temperatures exceed or go below the normal range of variation
11.4 Storms and flooding	Extreme precipitation and/or wind events or major shifts in seasonality of storms
11. 5 Other impacts	Other impacts
*12 Other direct threats**	Other threats
12.1 Information lacking	Lack of clearly documented threats

* **Note:** That this category is not part of the IUCN classification system and was added as part of the BCR planning process to address species of concern for which threats are not clearly documented and/or are unknown.

IUCN Conservation Action Categories

Table A-5: International Union for Conservation of Nature – Conservation Measures Partnership (IUCN-CMP) classification of conservation actions.

Note: Not all categories of actions were applicable or were recommended in each BCR or MBU. Encouraging industry compliance with voluntary beneficial management practices was classified under 5.3 Private sector standards and codes.

Action Category/Sub-category	Definition
1 Land/water protection	Actions to identify, establish or expand parks and other legally protected areas, and to protect resource rights
1.1 Site/area protection	Establishing or expanding public or private parks, reserves, and other protected areas roughly equivalent to IUCN categories I-VI
1.2 Resource and habitat protection	Establishing protection or easements of some specific aspect of the resource on public or private lands outside of IUCN categories I-VI
2 Land/water management	Actions directed at conserving or restoring sites, habitats and the wider environment
2.1 Site/area management	Management of protected areas and other resource lands for conservation
2.2 Invasive/problematic species control	Eradication, controlling, and/or preventing invasive and/or other problematic plants, animals and pathogens
2.3 Habitat and natural process restoration	Enhancing degraded or restoring missing habitats and ecosystem functions; dealing with pollution
3 Species management	Actions directed at managing or restoring species, focused on the species of concern itself
3.1 Species management	Managing specific plant and animal populations of concern
3.2 Species recovery	Maintaining, enhancing, or restoring specific plant and animal populations, vaccination programs
3.3 Species reintroduction	Reintroducing species to places where the formally occurred or benign introductions
3.4 *ex situ* conservation	Protecting biodiversity out of its native habitats
4 Education and awareness	Actions directed at people to improve understanding and skills, and influence behavior
4.1 Formal education	Enhancing knowledge and skills of students in a formal degree program
4.2 Training	Enhancing knowledge, skills, and information exchange for practitioners, stakeholders, and other relevant individuals in structured settings outside of degree programs
4.3 Awareness and communications	Raising environmental awareness and providing information through various media or civil disobedience
5 Law and policy	Actions to develop, change, influence, and help implement formal legislation, regulations, and voluntary standards
5.1 Legislation	Making, implementing, changing, influencing, or providing input into formal government sector legislation or policies at all levels: international, national, state/provincial, local, tribal
5.2 Policies and regulations	Making, implementing, changing, influencing, or providing input into policies and regulations affecting the implementation of laws at all levels: international, national,

Table A-5 continued

Action Category/Sub-category	Definition
	state/provincial, local, tribal
5.3 Private sector standards and codes	Setting, implementing, changing, influencing, or providing input into voluntary standards and professional codes that govern private sector practice
5.4 Compliance and enforcement	Monitoring and enforcing compliance with laws, policies and regulations, and standards and codes at all levels
6 Livelihood, economic and other incentives	Actions to use economic and other incentives to influence behavior
6.1 Linked enterprises and livelihood alternatives	Developing enterprises that directly depend on the maintenance of natural resources of provide substitute livelihoods as a means of changing behaviors and attitudes
6.2 Substitution	Promoting alternative products and services that substitute for environmentally damaging ones
6.3 Market forces	Using market mechanisms to change behaviors and attitudes
6.4 Conservation payments	Using direct or indirect payments to change behavior and attitudes
6.5 Non-monetary values	Using intangible values to change behavior and attitudes
7 External capacity building	Actions to build infrastructure to do better conservation
7.1 Institutional and civil society development	Creating or providing nonfinancial support and capacity building for nonprofits, government agencies, communities, and for-profits
7.2 Alliance and partnership development	Forming and facilitating partnerships, alliances, and networks of organizations
7.3 Conservation finance	Raising and providing funds for conservation work
*8 Research and monitoring**	Gathering information about species or habitat of concern
8.1 Research	Undertaking new or supporting, continuing and/or expanding existing research relating to specific species or threats
8.2 Monitoring	Establishing new or supporting, continuing, and/or expanding existing monitoring schemes to gather required data about individual or groups of species or habitats

* **Note**: This category is not part of the IUCN classification system, and was added as part of the BCR planning process to address certain actions that do not fit elsewhere in the IUCN scheme.

www.ec.gc.ca

Additional information can be obtained at:
Environment Canada
Inquiry Centre
10 Wellington Street, 23rd Floor
Gatineau QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800
Fax: 819-994-1412
TTY: 819-994-0736
Email: enviroinfo@ec.gc.ca